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# New York Zoological Society Annual Report 1987-88



**New York Zoological Society. . .**  
**In New York and Around the World**



**Bronx Zoo**



**New York Aquarium**



**Wildlife Conservation International**



**Osborn Laboratories of Marine Science**



**Wildlife Survival Center**



**Central Park Zoo (City Zoos Project)**

## Saving Wildlife, Teaching Ecology, Inspiring Care

The New York Zoological Society, a private, non-profit organization, was chartered by the State of New York in 1895, "for the promotion of zoology... the instruction and recreation of people... zoological research and publication, the protection of wild animal life, and kindred purposes." Today, the Society continues to pursue these goals in New York and globally, but with an ever greater urgency to preserve vanishing wildlife, support conservation in the field, conduct research in animal health and husbandry, and educate and serve a largely urban audience.

The Society currently operates six distinct but inter-related divisions: the Bronx Zoo, the New York Aquarium and Osborn Laboratories of Marine Sciences in Brooklyn; Wildlife Conservation International (WCI), with field projects around the world; the Wildlife Survival Center on St. Catherines Island, Georgia; and the City Zoos Project. Under an agreement with the City of New York, the Society has renovated and assumed the management of the Central Park Zoo, and will rebuild and manage the zoos in Prospect Park and Flushing Meadows Park.

The Bronx Zoo opened in 1899 and is still the largest urban zoo in the United States. The 265-acre park houses 3,963 animals of more than 650 species and subspecies in surroundings that resemble their natural habitats as closely as possible. Recent years have seen the opening of several remarkable exhibitions, including the World of Darkness (1969), the first exhibition to successfully reverse night and day; the Lila Acheson Wallace World of Birds (1972), with its innovative habitats, treetop exhibits, and interpretive displays of bird and plant life; Wild Asia (1977), a 38-acre habitat for endangered Asian species; the expanded Children's Zoo (1981); the Carter Giraffe Building for the Zoo's breeding collection of giraffes, zebras, cheetah, slender-horned gazelles, and ostriches; the Harry Dejur Aviary in the refurbished Great Flying Cage (both 1982); JungleWorld, a complex of spectacular indoor habitats for tropical Asian wildlife (1985); Himalayan Highlands (1986), a mountainside and marsh habitat for snow leopards, red pandas, tragopans, and white-naped cranes; and MouseHouse (1988), home of 28 rodent species, 3 rodent predator species, and 1 rodent look-alike, ranging in size from the cloud rat (4 lbs.) to a tiny mouse gerbil (0.6 oz.).

These exhibitions and facilities are part of a comprehensive program of renewal and growth that has come to be called "Zoo Renaissance," and each has been important to the development of new audi-

ences for the Zoo. In fiscal 1988, the Children's Zoo alone was visited by 579,147 people; the Bengali Express monorail provided guided tour through Wild Asia for 640,796; JungleWorld admitted 547,323 people; and 1,044,193 people visited Yong Yong and Ling Ling, giant pandas here on a six-month visit from the People's Republic of China. Overall, Zoo attendance for the year was 2,332,483.

To interpret the Zoo's collections, the Society maintains the oldest and most diverse zoo education program in the United States. During the year, 32,834 students, teachers, and general audience adults and children took part in 60 classes and special seminars at the Zoo. Schoolchildren and campers numbered 395,002 in 11,286 groups. The Education Department's volunteer group, Friends of the Zoo, gave guided tours to 10,313 schoolchildren on weekdays and 2,347 people on weekends during the year. FOZ outreach guides visited 2,655 institutionalized adults and children.

*Zoos for Effective Science Teaching (ZEST) and Wildlife Inquiry through Zoo Education (WIZE)* are examples of the Education Department's national leadership. In a series of seminars at the Zoo, ZEST trains teachers from around the country and the metropolitan area on how to use zoos in environment and life science education. Module I of WIZE, *Diversity of Lifestyles*, the first wildlife survival curriculum linking zoos and classroom learning, is currently used in hundreds of junior and senior high school classrooms throughout the United States. The second module, *Survival Strategies*, tested in fourteen states and recommended by the U.S. Department of Education, will soon be available nationally.

Founded independently in 1896, the New York Aquarium became part of the New York Zoological Society in 1902, and has been located at Coney Island since 1957. More than 3,300 specimens of 275 aquatic species are on view in 54 exhibitions, including Our Native Sea Life (1974), the spectacular Shark Tank, which opened in 1980; the Bermuda Triangle and African Rift Lake (both 1981); Giant Japanese Spider Crabs (1984); European Cuttlefish (1985) and the Red Sea Exhibit (1986).

Among the 775,227 visitors to the Aquarium in fiscal year 1988 were 358,838 schoolchildren in 5,966 organized groups. In addition, 24,314 children and adults attended 836 classes and programs. The Aquarium has pioneered in family education and works closely with local school boards on innovative programs for primary and secondary school students.

Now in the midst of renewal, which has included the new Marine Mammal Holding Facility and renovation of the Beluga Whale Tank, the Aquarium is now building Discovery Cove, a major new education-exhibition facility, and plans are being completed for Sea Cliffs, an indoor-outdoor sequence of coastal habitats for seals, walruses, penguins, and sea otters.

Like all the Zoological Society's programs involving rare and endangered animals, the Aquarium is also engaged in captive breeding. Black-footed penguins have bred with great success for several years, and a program for beluga whales is being developed. The Aquarium also serves as a rescue and rehabilitation center for stranded marine animals, including harbor seals, whales, and sea turtles.

The Society's tradition of joining research and conservation with exhibition and education is exemplified by the union of the Aquarium with its sister institution on Coney Island, the **Osborn Laboratories of Marine Sciences (OLMS)**, dedicated in 1967. The two institutions work together closely, with the Aquarium providing subjects for study by OLMS scientists, and OLMS conducting tests that are essential to the care, breeding, and nutrition of the Aquarium collection.

OLMS studies in fish genetics have contributed significantly to aquaculture and biomedical research. The development of highly inbred stocks of fish, some started more than 75 generations ago, has resulted in a genetic uniformity and reproductive that has been essential for basic research on hormones, drugs, pollutants, and other toxins, as well as on growth, reproduction, sex determination, and the origins of cancer.

Other areas of study are pathology, microbiology, physiology, pharmacology, bio-organic chemistry, virology, embryology, pollution, planktonology, and vertebrate biology. OLMS offers post-doctoral fellowships in aquaculture, and the opportunity for undergraduate students to receive credit toward their college degrees by assisting in research projects.

The **City Zoos Project** was launched in 1980, when the New York Zoological Society signed the first of two agreements to renovate and ultimately take over operation of the three zoos run by the City of New York's Department of Parks and Recreation. These outmoded, severely inadequate facilities in Central Park, Manhattan, Prospect Park, Brooklyn, and Flushing Meadows Park, Queens, have been completely redesigned to reflect modern concerns with conservation, education, and habitat exhibition. In effect, the Society is using its 93 years of experience and expertise to create an entirely new system of City zoos. The 5.5-acre Central Park Zoo, with its tropic, polar, and temperate zone environments en-

circling a central garden and sea lion pool, opened to the public on August 8, 1988.

Beginning with a survey of Alaskan wildlife in 1897, the Society has been in the forefront of international conservation for 91 years. With a staff of fourteen full-time zoologists, three based at the Bronx Zoo and eleven in the field, **Wildlife Conservation International (WCI)** currently sponsors 82 projects in 37 countries, primarily in Africa, Asia, and Latin America, developing the scientific information and institutional support necessary for the management and preservation of wildlife resources. WCI scientists help to establish parks and reserves, train parks administrators and scientists, study the status of vanishing species, plan accommodations between ecology and economic development, and even equip special conservation and education programs.

In March 1988, WCI's entire staff met at the Wildlife Survival Center on St. Catherines Island to redefine WCI's working agenda. As a result of the meeting, WCI's conservation interests were divided into regional programs: East African Grasslands, Central African Forests, Northern South America, Southern South America, Mesoamerica and the Caribbean Basin, Southeast Asia, and Central Asia.

WCI Director for Science George Schaller traveled to Vietnam to prepare for an upcoming survey of the kouprey, and exceedingly rare forest-dwelling bovid. Director David Western launched a major campaign to protect embattled African rhinos and elephants. Archie Carr III, after eight years as Assistant Director in New York, assumed the role of Regional Coordinator of Mesoamerican and Caribbean projects. Based in Florida, Carr is building a network of native Central American scientists to focus on the rain forests of the Petén regions of Mexico, Guatemala, and Belize. And Research Zoologist Thomas Struhsaker is working toward a global rain forest strategy.

Other WCI staff projects include the protection of Magellanic penguins and other Argentinean wildlife under the leadership of William Conway and Dee Boersma; an expanded study of cats and their ecology in Thailand's forests by Alan Rabinowitz; ornithologist Stuart Strahl's surveys of endangered birds and supervision of numerous studies in Venezuela; Charles Munn's efforts on behalf of macaws and the threatened wilderness of Manu National Park, Peru; Patricia Moehlman's assessment of conservation needs in the Ngorongoro Crater and at the Ruaha National Park in Tanzania; Terese and John Hart's research on the okapi and the preservation of rain-forest habitats in Zaire's Ituri Forest; and Jesse C. Hillman's coordination of conservation activities for the Ethiopian government.

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The City of New York, through its Department of Cultural Affairs, provides annual operating support for the Bronx Zoo and the New York Aquarium, both of which occupy City-owned buildings on City-owned property.

The Society also receives funds annually from the Natural Heritage Trust, a program of the New York State Office of Parks and Recreation.

Cover: *The diverse Cracid family is endangered in Central and South America. Breeding at the Wildlife Survival Center and the Bronx Zoo complements field projects by Wildlife Conservation International scientists, including the work of Dr. Stuart Strahl in Venezuela, on these important birds. This painting of 8 Cracid species by Venezuelan biologist and artist Alejandro Grajal announced an international symposium convened in Caracas by Dr. Strahl.*



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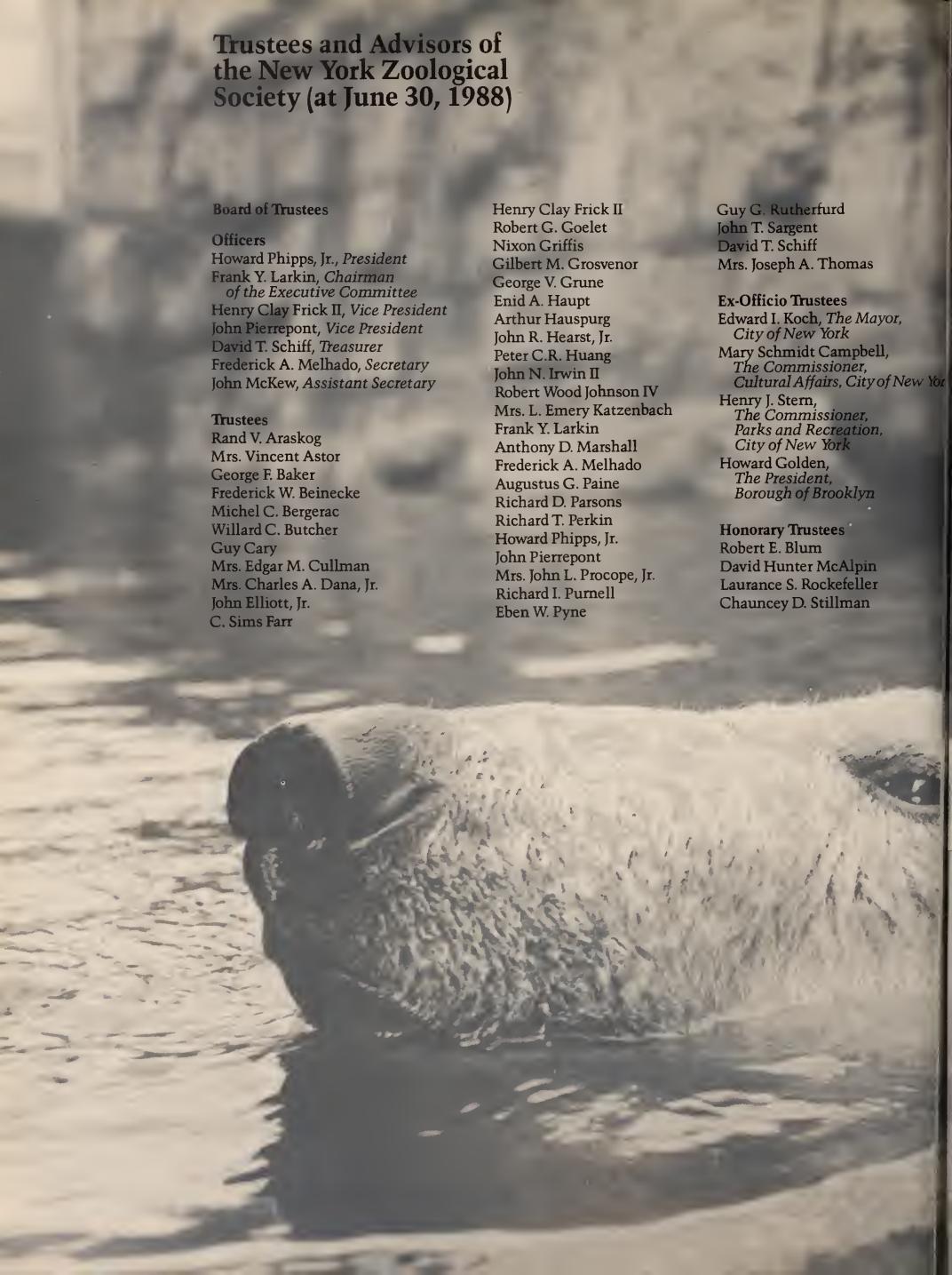
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# NEW YORK

# THE NEW ZOO



FINALLY, A  
STATE-OF-THE-ART  
HABITAT FOR  
SOME OLD FRIENDS  
AND NEW IN  
CENTRAL PARK  
BY CARTER WISEMAN

## Report of the President

Packed into the month of June 1988 were several events reflecting the Society's strong and diverse links with New York City's people, government agencies, and private institutions. The focus of attention of course, was the nearly completed new Central Park Zoo, which had been under construction since April 8, 1985, and was scheduled to open on August 8, 1988.

As the finishing touches were applied to exhibits and gardens, as hundreds of exotic and colorful creatures were introduced to their tropical, temperate, and polar environments, people who had made the new zoo possible gathered to celebrate and to wonder at what their support and the collaboration of many talents had wrought. There were tours for NYZS trustees and for the Municipal Arts Society. There was a Corporate Preview dinner that raised \$250,000 for the Society. The Central Park Zoo Celebration dinner of the NYZS Women's Committee raised \$400,000 for Discovery Cove at the Aquarium. Parties were organized by Reader's Digest, which continues the tradition of interest and support established by the late Lila Acheson Wallace, the new zoo's primary private benefactor and inspiration. And finally, on June 28, the Society held a Gala Preview dinner to honor its principal partners in the zoo's renewal: the City of New York, the Department of Parks and Recreation, and all major donors.

The Central Park Zoo is itself a dramatic setting for wildlife of all kinds and for children and adults to learn about the precious heritage we are determined to protect. Now we move on in the City Zoos Project, under Richard Lattis, and in partnership with the Department of Parks and Recreation, to the renewal of the zoos in Prospect Park and Flushing Meadows Park, due to begin during the coming year. New Yorkers will soon have an unprecedented metropolitan system of zoos under NYZS management, all designed and operated according to the same high standards of humane animal management, exhibition esthetics, and ecological education.

No less remarkable was the growth of the Society's conservation activities abroad through Wildlife Conservation International. At year's end, WCI was sponsoring 82 field projects in 37 countries around the world, supported by contributions that rose 55 percent over the previous year. Particularly encouraging was the response to a nationwide appeal on behalf of the Rhino Rescue Fund, which raised more than \$144,000 to help save the rapidly disappearing black rhino in East Africa. In addition, \$500,000 was granted by The Nichols Foundation, in honor of the late Charles W. Nichols,



New York City and NYZS officials cut the ribbon to open the Central Park Zoo on August 8, 1988.

Jr., to endow African conservation projects, and significant gifts were received from the Art Ortenberg and Liz Claiborne Foundation, the Pew Charitable Trusts, and the Jessie Smith Noyes Foundation, among others, for projects in Africa, Asia, and Latin America

The Nichols Foundation also helped one of the Bronx Zoo's most important upcoming capital projects with a grant of \$500,000 toward the renewal and restoration of Astor Court. Elsewhere at the Zoo, work was well underway on the John Pierrepont Wildfowl Marsh, for which the 1988 President's Dinner in honor of long-time Trustee and Vice President Pierrepont raised more than \$143,000.

Mr. Pierrepont also was active as Chairman of the Development Committee, which helped guide the effort to raise more than \$8 million last year for all purposes, and of the Conservation Committee. Other volunteer leadership was provided by Trustee John Elliott, Jr., and John Chancellor, co-chairmen of the Annual Patrons; Dr. Henry Clay Frick II, Chairman of the Aquarium and Osborn Laboratories Planning Committee; and Advisor Marshal Manley, Chairman for the second year of the Business Committee. The Women's Committee capped Leslie Perkin's highly successful first year as president with the Central Park Zoo event. Society-wide funds came from a record 33,610 members, 356 Annual Patrons, more than 200 private foundations and 130 corporations, and thousands of individual contributors, including 35,000 for WCI alone.

Total government funding increased slightly for the year. The City of New York, through the Department of Cultural Affairs and the Department of Parks and Recreation, budgeted \$9,405,026 for basic operating expenses of the Bronx Zoo, New York Aquarium and Central Park Zoo, including keeper salaries and fuel costs. The State's contribution, through the Natural Heritage Trust, was \$2,065,669. And the Federal government provided \$432,710, including grants from the Institute of Museum Services, the National Science Foundation, the National Institutes of Health, and the Office of Naval Research.

The year was attended by sadness at the deaths of two valued and prominent leaders of the Society: Dr. George D. Ruggieri and Charles W. Nichols, Jr. George was Director of the New York Aquarium and the Osborn Laboratories of Marine Sciences. His scientific contributions focused on food and drugs from the sea, but it is for his unforgettable personality and the uniquely warm and happy way in which he combined his disciplines, as priest, aqua-

ium director, and marine biologist, that he is remembered — and he is very deeply missed. Louis E. Garibaldi, who began his career at San Francisco's Steinhart Aquarium in 1966 and had served as Associate Director here since 1983, was appointed Director of the Aquarium.

Charlie had been a Trustee since 1966 and was, at his death, Honorary Chairman of the Board. He sat on many NYZS committees, helped establish the Conservation Committee in 1969, and served as its Chairman from then until 1976. A cherished friend and forceful leader, he had a lifelong devotion to conservation, particularly in Africa, and he played a major role in shaping the Society's activities there.

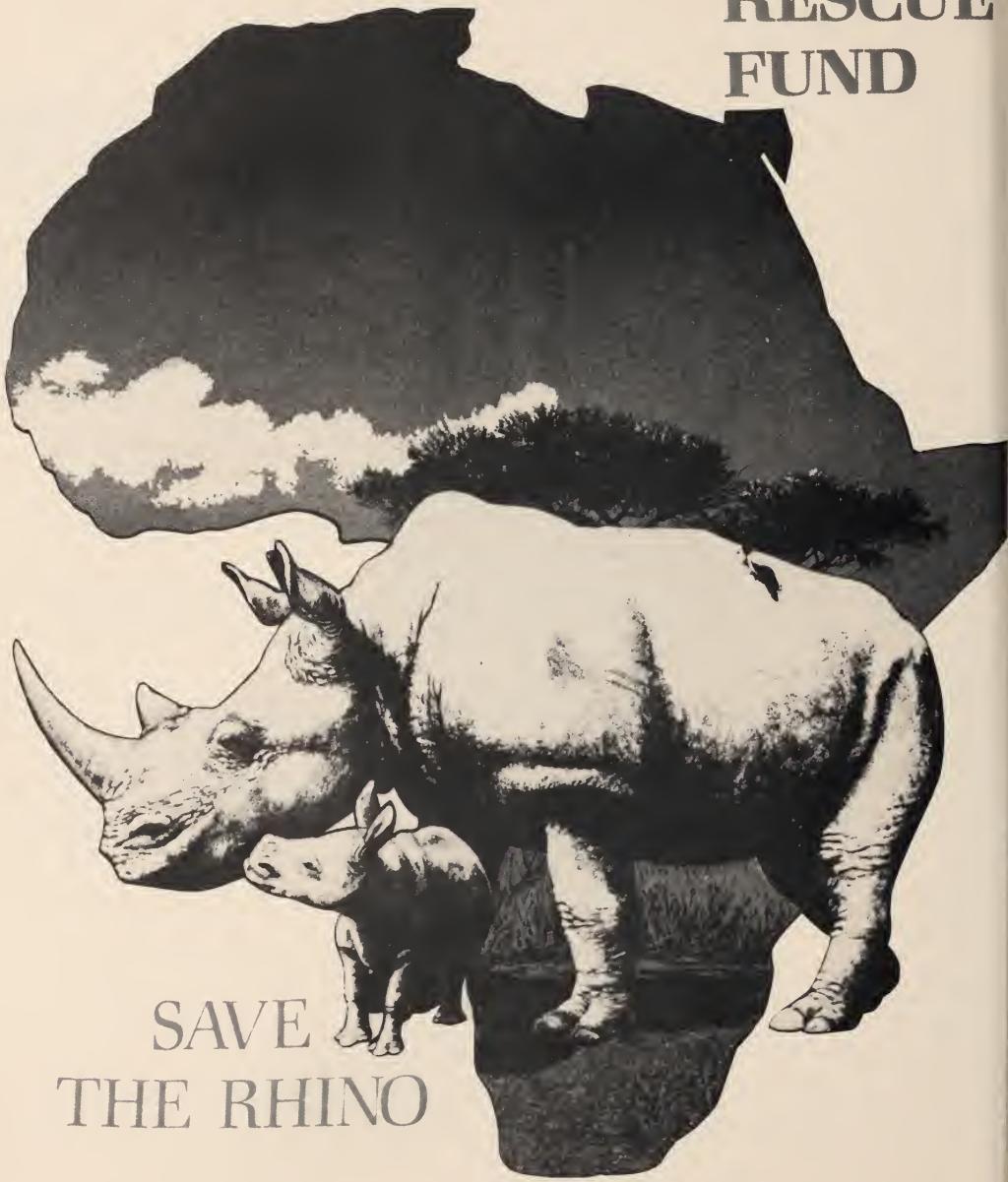
Elected to the Board of Trustees this year was Richard D. Parsons, President of the Dime Savings Bank of New York. Joining the Board of Advisors was Peter G. Schiff, a dedicated member of the Aquarium and Osborn Laboratories Planning Committee, and Nelson A. Rockefeller Jr., who is helping to form a new group of young people for leadership in the Society.

The Society's Gold Medal in 1987 was awarded to Nixon Griffis, who as a Trustee since 1974 has been an extraordinary contributor to the scientific and exhibition programs at the Zoo and Aquarium.

The Board's special thanks go to members of the Society's professional staff who have worked so creatively and enthusiastically over the past year and a half, under the leadership of General Director William Conway, to redefine the Society's mission as a new kind of institution for conservation, education, and public service. Their proposals and plans for the future have brought us to the verge of a major new campaign for the Society's second century.

**Howard Phipps, Jr.**  
President

# RHINO RESCUE FUND



SAVE  
THE RHINO

# Report of the General Director

## Bad news, better news, hope

Recently, almost all the news about wildlife has been bad. The world is in an extinction crisis. At home, the last California condor and last black-footed ferret have had to be rescued from "nature." Abroad, we are sickened by the greedy poaching of pandas and rhinos, the deaths of mysteriously diseased seals, the destructive pet trade in rare parrots, and the loss of yet another forest home of wild gorillas. But there are better stories.

Peregrine falcons, Arabian and scimitar-horned oryx, golden-lion tamarins, and Bali mynahs are being returned to nature after having been given up for lost. Already the first of the rescued ferrets and condors have been successfully bred. New parks and reserves are being gazetted, and fledgling conservation consciousness is trying to fly in even the remotest of lands.

So long as someone cares enough to sustain at least the "seeds" of wildlife populations and natural habitats, there is the possibility of some sort of restoration. We may hope for another chance.

## Planning a new kind of institution

Both the bad news and hope have shaped and buffeted more than two years of intensive staff and trustee planning for the New York Zoological Society's future — a complex and difficult process coordinated by Assistant Director Kathleen Wilson. Recently evolved directions in the Society's programs of wildlife conservation, community education, and public inspiration provided models for the process of choosing priorities. We emerged with a new and newly reinforced vision of the Zoological Society and a fresh realization of its leadership responsibilities — what it could do and what it must do.

Faced with the rising tide of wildlife extinction worldwide, we seek nothing less than to design our institutions and programs to help save as much of nature, as much of wildlife, as possible. We seek to join with others in a global effort. We are the people who *should* be concerned with hairy rhinos and Hawaiian honey creepers, coral reef fishes and horned frogs, snow leopards, gorillas, tortoises, and tigers, assets unsalable but invaluable.

The Society envisions its zoos and aquarium, and the St. Catherines Wildlife Survival Center (and proposed new centers), as attractive and effective sanctuaries and survival centers for beleaguered wild creatures. We plan to strengthen the Society's far-flung international conservation effort, Wildlife Conservation International, in providing on-site scientific data for local



A male proboscis monkey sounds a warning in JungleWorld, one of the species' few refuges outside the threatened mangrove forests of Borneo.

decision-makers, training conservation professionals, and inspiring people toward the preservation of their natural heritage. Implementation of these ideas is based upon several perceptions

First, a strong, fiscally sound home base is essential — to serve the people of New York and support the Society's far-reaching education and conservation programs. While becoming sanctuaries for the propagation of vanishing species, the great Bronx Zoo, heart of the overall program, and the New York Aquarium must also be compelling educational and recreational destination

Second, we recognize that educational processes and economic progress cannot proceed fast enough to thwart the great wave of wildlife extinction now washing over much of the world. But the Society can provide conservation leadership in areas where others are not. We can save critical pieces of nature and many wild creatures which would otherwise be lost. Unlike any other organization, we deal with and take care of *living* wild creatures while at the same time maintaining an interactive full-time field staff of conservation scientists in Third World countries, where the problems are especially severe.

And third, we must accelerate the outreach of our proven and powerful education programs, especially for children, which not only teach how nature works, but also why it matters.

Our two-year process of review, self-criticism, blue-sky imagining, and careful comparison underlined the challenge. The Society provides a distinctive service for society — it *can* make a difference by preserving wild creatures and places from extinction.

As expected from the start, the realization of proposed projects and programs will depend on the success of a major fund-raising campaign. Architectural studies are already underway, cost estimates are being developed, and the entire campaign is being considered by trustees, staff, and fund-raising counsel in terms of priorities and feasibility.

### **Mission renewed**

When the Zoological Society was founded in 1895, there was no thought of administering the New York Aquarium nor of creating a multi-nation overseas conservation effort like Wildlife Conservation International, although the first NYZS field programs were underway even before the Bronx Zoo opened. Suggestions that the Society might operate the 1864 Central Park Zoo were specifically deflected. Education, research, and exhibition departments had not been visualized, and the breeding of endangered species had been barely contemplated... and then with some

embarrassment. Yet, the Society's founders set forth a trilogy of purposes which still makes sense:

"A Public Zoological Park  
The Preservation of our Native Animals  
The Promotion of Zoology"

In rethinking these objectives, our staff-trustee committees could consider that last year 3,107,710 people visited the New York Zoological Park and the New York Aquarium and nearly 600,000 utilized NYZS education and publication programs. Some 1,100 wild animals, 65 of seriously endangered species, were bred. An institution-wide effort brought the Central Park Zoo to completion and under NYZS administration (it opened August 8, 1988, just after the period covered by this Report). National awards were won for leadership in wild animal exhibiry and care, in this case for the new Himalayan Highlands snow leopard exhibit and the Society's superb propagation program for this vanishing species. Major breakthroughs emanated from our Animal Health Center nutrition laboratories in the Bronx concerning the essential nature of vitamin E in wild animal metabolism. At the same time, an international campaign was launched to save Africa's fast diminishing black rhinoceros, and efforts were continued to win more protection for Caribbean reefs, Tibetan wildlife, West African manatees, African elephants, Venezuelan curassows, and Peruvian macaws. Help was provided for a host of other threatened wild places and wild creatures in more than 30 countries.

Today, the Zoological Society focuses an entirely unique collaboration of specialized wildlife scientists, educators, artists, and administrators within a newly stated but still compatible trio of New York Zoological Society objectives:

"To Sustain Biological Diversity  
To Teach Ecology  
To Inspire Care"

As we contemplate the Zoological Society at 93, with its growing system of zoos, doubling aquarium, proliferating local public services, and intensifying overseas programs, we have a new kind of institution in mind. It is a caring, multifaceted sanctuary for wild creatures and places that need help, a home from which restoration efforts may one day be launched, a park for instilling biological literacy and conservation concern, and a continuing effort to preserve as much of wildness for future generations as possible.

**...SE EXTINGUE.**

**¡NO LO PERMITAS!**

La cacería indiscriminada  
la acelerada destrucción del ambiente  
están causando la desaparición  
del único oso suramericano.



**William Conway**  
General Director



# HAPPY ZOO YEAR 1987

**The  
Year  
of the  
Panda**



**THE NEW  
BRONX  
ZOO**

COME SEE LING LING AND YONG YONG, OUR VISITORS FROM THE PEOPLE'S REPUBLIC OF CHINA, AT THE NEW BRONX ZOO.

DATES: NOW THROUGH JULY 31, 1987. HOURS: 10AM-5PM MONDAY-SATURDAY 10AM-5:30PM SUNDAYS & HOLIDAYS. ADMISSION TO THIS EXHIBIT: \$1.00 FOR ADULTS AND \$.50 FOR CHILDREN AFTER GENERAL ZOO ADMISSION. BRONX RIVER PARKWAY AND FORDHAM ROAD. FOR INFORMATION, CALL: (212) 367-1010.

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The New York Zoological Society is The Bronx Zoo, The New York Aquarium, Wild Conservation International, Bronx Park, the Bronx Museum of Marine Sciences and St. Catherine's Wildlife Survival Center.

# New York Zoological Park (Bronx Zoo)

## Mammalogy

### Farewell to Ling Ling and Yong Yong

After their popular six-month visit, two giant pandas from the Beijing Zoological Gardens, Ling Ling and Yong Yong, departed from the Bronx Zoo on November 6, 1987. More than one million persons saw the animals in their habitat exhibition and contributed toward giant panda conservation in China.

Visitors learned that there are less than 1,500 giant pandas remaining in nature, and that the Chinese government has established twelve forest reserves in Sichuan, Shaanxi, and Gansu provinces to help save this severely endangered species. They also learned that NYZS is collaborating with Chinese scientists to strengthen efforts at preserving the pandas' natural habitat and improving their captive breeding. Throughout the stay of Ling Ling and Yong Yong, Mammalogy Department staff worked closely with the visiting Chinese technical team.

### Building a better MouseHouse

An exhibition celebrating the rodents of our planet, which represent 43 percent of the 4,000 known mammal species, opened on April 29, 1988, in the former Small Mammal House. MouseHouse includes examples of the three major rodent groups: sciuro-morpha (squirrel-like), caviomorpha (cavy-like), and myomorpha (mouse-like), in 34 naturalistic displays representing four ecological zones: grasslands, tropical forest, temperate woodlands, and desert. The glass-fronted exhibits of the newly renovated building were designed to allow close-up views of the animals.

MouseHouse inhabitants range in size from the small to the very small, from the Philippine slender-tailed cloud rat, weighing about four pounds, to the African zebra mouse, which at  $\frac{1}{4}$  ounce barely tips the scales. In between are the Kusu rat, the chinchilla, the giant pouched rat, and many creatures with names longer than they are, like the short-tailed gerbil and the Egyptian spiny mouse. And what would MouseHouse be without a house mouse or the common Norway rat? Illustrating the "balance of nature" are several rodent predators, including the dwarf mongoose, spotted skunk, and red-tailed rat snake.

### Primate jewels of the New World

The exhibits in the beautiful old Monkey House of 1901, long recognized as unsuitable for larger primates, were redesigned in a naturalistic manner for New World primates, with special emphasis on small, jewel-like marmosets and tamarin monkeys. Some of the stars of the building are golden lion tamarins, red-handed tamarins, pygmy marmosets, mustached tamarins, cotton-top marmosets, and white-faced capuchin monkeys.

The renovated Monkey House provides much needed additional space for small primate breeding, which has become increasingly important as wild populations continue to decline. Notable primate births this year at the Zoo include Goeldi's monkeys, a saki monkey, white-face capuchins, saddle-backed tamarins, common marmosets, Geoffrey's tamarins, a white-handed gibbon, silvered leaf monkeys, and lowland gorillas.

### Staff activities

Curator James Doherty, as a member of the IUCN Black-footed Ferret Captive Breeding Specialist Group, made several trips to Wyoming to participate in the management of the only surviving population of this severely endangered North American mammal. Promisingly, this was the best breeding season ever for the captive ferret population, with 12 females producing 38 offspring, bringing the known total population to 62. At the request of the U.S. Fish and Wildlife Service, Mr. Doherty also attended a meeting in India aimed at improving New Delhi's National Zoological Gardens.



Dwarf mongooses are among the 38 species in MouseHouse.



Associate Curator Fred Koontz led an NYZS sponsored safari to East Africa to view wildlife in several of the National Parks of Kenya and Tanzania. While in Africa, Dr. Koontz traveled to Ethiopia to discuss the conservation status of the gelada baboon with WCI's Dr. Chris Hillman and officials of the Ethiopian Wildlife and Conservation Office. Dr. Koontz also assisted the Central Park Zoo in their collecting trip for tufted puffins on Kodiak Island, Alaska.

Penny Kalk was promoted to Collections Manager. She also completed the "Applying Behavioral Research to Zoo Animal Management" course offered at the Dallas Zoo. Frank Casella and Patrick Thomas were promoted to Supervisor, and Michael Tiren and Claudia Wilson both received promotions to Assistant Supervisor.

The department moved its headquarters to the renovated former Animal Hospital, which now houses offices for curators, collection managers, and support staff. The new Mammal Center includes three off-exhibit animal spaces where staff can conduct research on the management of little-known species.

Triska's second birthday party reflected the Zoo's success in gorilla breeding.

#### Mammal Census, Bronx Zoo (as of December 31, 1987)

Orders	Families	Species and subspecies	Specimens in Zoo	Specimens owned
Marsupialia — Kangaroos, phalanger, etc.	2	2	82	89
Insectivora — Hedgehogs	1	1	12	12
Chiroptera — Bats	4	9	622	606
Primates — Apes, monkeys, marmosets, etc.	6	24	211	213
Edentata — Armadillos, sloths, anteaters	1	1	2	2
Rodentia — Squirrels, mice, porcupines, etc.	13	35	211	207
Carnivora — Bears, raccoons, cats, dogs, etc.	6	24	109	102
Pinnipedia — Sea lions, etc.	1	1	9	9
Proboscidea — Elephants	1	1	6	8
Perissodactyla — Horses, rhinoceroses, etc.	3	5	43	52
Artiodactyla — Cattle, sheep, antelope, etc.	8	32	520	563
<b>Totals</b>	<b>46</b>	<b>135</b>	<b>1,827</b>	<b>1,863</b>

N.B. Specimens in Zoo include 68 on loan to the NYZS from other collections. Specimens owned include 103 on loan to other collections from the NYZS. There were 70 species listed as endangered, threatened, or vulnerable. Births totaled 525.

### Hummer and BOP breeding

Two priority breeding programs achieved a measure of success with the hatching of a Costa's hummingbird and a red bird of paradise in spring 1988. Both were firsts for the Bronx Zoo. Because their social systems do not allow males and females to be kept in pairs, hummingbirds and birds of paradise are difficult to breed. The staff is working to solve problems of social management, nutrition, and husbandry for these important avian families, while planning specialized breeding facilities in which ongoing breeding programs can be conducted.

A key element in the hummingbird hatching at the World of Birds was the development of a new diet. In addition, keepers were able to assist the female in building a nest.

The breeding rituals and attendant problems in captivity of birds of paradise are even more complicated, and have been under constant study by the staff in Propagation I over the past four years. Male-female interactions are now better understood, and in the successful hatching of the red, the egg was taken for incubation after a few days. The Zoo now has five species with breeding potential; four twelve-wired, three lesser, and four king birds of paradise were added last year.

### Acquisitions and alterations

The link between the Zoo and the Society's long-term study of Magellanic penguins in Argentina, conducted by Wildlife Conservation International, was finally made with the addition of eight Magellanic, captive-hatched in San Francisco, to the DeJur Aviary for Colonial Seabirds. It is hoped that a breeding program can be established in this rocky coastal environment, which is based on the Magellanic's own habitat at Punta Tombo.

Also added were pairs of spangled and purple-breasted cotingas from the tropical forests of northern South America, the former for the Jungle Stream in the Aquatic Bird House, the latter for the World of Birds. Very little is known about this widespread and extremely diverse family, but the department hopes to develop data that can be used to establish a successful breeding program.

At the Aquatic Bird House, the Swamp exhibit was completely renovated, with the help of the Exhibition and Graphic Arts Department. New cypress trees were installed and new plantings introduced. A misting system was added to provide bathing for

birds and help in cleaning, and a mural was painted to give the tableau depth and mystery.

### SSP activities

The department's involvement in the AAZPA's Species Survival Plans (SSP) now includes three studbooks that are maintained by Society staff: the white-naped crane by Curator Christine Sheppard, who is also chairman of the SSP committee for this species; the red-fronted macaw by Wendy Turner at St. Catherines Island; and the pink pigeon by Keeper Kurt Hundgen — the last appointed last year. A meeting of the white-naped crane committee, conducted by Dr. Sheppard, outlined the demographic structure for long-range breeding of the species and recommendations for the management of each crane in the United States.

A milestone was achieved in the Bali mynah SSP program, in which the Bronx Zoo has participated for several years. As chairman of the AAZPA's Wildlife Conservation and Management Committee, NYZP Chairman of Ornithology Donald Bruning escorted a group of 40 birds bred at eleven American zoos to Indonesia, where they will become part of a breeding program at the Surabaya Zoo. Offspring of this group will eventually be released on Bali to increase the population of wild birds.



A hopeful beginning for bird of paradise breeding was the hatching of this red bird of paradise.



#### Other curatorial activities

In addition to his AAZPA leadership position, Dr. Bruning continues to serve as chairman of the Parrot Specialist Group of the International Union for the Conservation of Nature and Natural Resources [IUCN]. He assisted in the development of laws in New Jersey and Pennsylvania, which are modeled on New York State regulations he helped to formulate and pass.

In September 1987, Dr. Sheppard chaired a committee of avicultural experts convened to review the Whooping Crane Propagation Program at the Federal government's Endangered Species Breeding Center in Patuxent, Maryland. She also was named co-chair of newly formed AAZPA advisory groups for cranes and parrots, and helped initiate and coordinate two workshops on hornbills and tanagers at the AAZPA's regional Great Lakes annual meeting.

The first Costa's hummingbird chick in the World of Birds is fed by its mother.

Bird Census, Bronx Zoo (as of December 31, 1987)

Orders	Families	Species and subspecies	Specimens in Zoo	Specimens owned
Struthioniformes — Ostriches	1	1	3	3
Rheiformes — Rheas	1	1	6	6
Casuariiformes — Cassowaries, emu	2	2	4	3
Tinamiformes — Tinamous	1	2	5	5
Sphenisciformes — Penguins	1	1	8	5
Pelicaniformes — Pelicans, cormorants	2	4	6	6
Ciconiiformes — Herons, storks, flamingos, etc.	5	14	118	119
Anseriformes — Swans, ducks, geese, screamers	2	39	130	129
Falconiformes — Vultures, hawks, eagles	3	6	18	16
Galliformes — Quail, pheasant, etc.	2	24	95	99
Gruiformes — Heliopodes, cranes, rails, etc.	5	18	67	77
Charadriiformes — Plovers, gulls, etc.	8	20	98	98
Columbiformes — Pigeons, doves	1	11	36	24
Psittaciformes — Parrots, etc.	3	13	45	48
Cuculiformes — Touracos	2	6	16	18
Strigiformes — Owls	2	7	9	9
Caprimulgiformes — Frogmouths	1	1	8	9
Apodiformes — Hummingbirds	1	2	9	9
Coraciiformes — Kingfishers, hornbills, etc.	7	16	34	28
Piciformes — Barbets, toucans, woodpeckers	2	6	13	13
Passeriformes — Perching birds	26	91	135	137
<b>Totals</b>	<b>78</b>	<b>285</b>	<b>863</b>	<b>861</b>

**N.B.** Specimens in Zoo include 66 on loan from other collections. Specimens owned include 64 on loan to other collections from the NYZS. There were 91 species listed as endangered, threatened, or vulnerable. Hatchings totaled 170.

## Herpetology

### Keeping up with SSP

Conservationists predict that by the end of the twentieth century, 15 to 20 percent of all plant and animal species will become extinct, including some 1,000 of the known 6,600 reptile species. By establishing Species Survival Plans, the American Association of Zoological Parks and Aquariums (AAZPA) is working to strengthen and coordinate captive-breeding programs for critically endangered species, programs that will help to prevent extinctions. The Bronx Zoo's Herpetology Department actively participates in all four of the SSP programs that have been set up for reptiles. It is a small number, but a hopeful beginning.

Curator John Behler is SSP Species Coordinator and Studbook Keeper for the Chinese alligator. During this past year, the NYZS Chinese alligator breeding program produced a total of 17 young, and 20 more eggs were being incubated at Florida's St. Augustine Alligator Farm, from parents on breeding loan from the NYZS. Today there are 70 rapidly growing young Chinese alligators in ten U.S. zoos, a significant improvement over 1976, when there were only five very old non-breeding specimens in three institutions. In response to an official invitation from China's Bureau of International Cooperation and the Institute of Developmental Biology, Behler visited China to explore the possibilities for international cooperation in propagating and protecting the species. While there, he toured the Changxin County Alligator Farm, 100 km from the city of Hangzhou, where a modest but successful breeding program began in 1982.

Superintendent William Holmstrom, SSP Species Coordinator and Studbook Keeper for the Malagasy radiated tortoise, reported that there are 300 animals registered in the studbook and that this year 33 tortoises hatched at the NYZS's Wildlife Survival Center on St. Catherines Island. Holmstrom also serves on the SSP propagation group for Dumeril's ground boa, another endangered Malagasy reptile. Fourteen boas were born to a captive-bred female at the Zoo during 1988, sired by a wild-caught male.

Through the Nixon Griffis Fund for Zoological Research, the Society provided support for the work of yet another SSP group — the Aruba Island rattlesnake propagation program. And the Griffis Fund also financed biologists who are trying to develop a vaccine against the deadly paramyxovirus that threatens this and other viper species.

### Breeding and acquisitions

One of the Zoo's six breeding crocodilians, the broad-nosed caiman from Brazil and Argentina, produced eight offspring in its second year of breeding. Hatchings and births were also recorded for wood and spotted turtles from North America; Coahuilan box turtles, Taylor's cantils [a species akin to North America's water moccasin], and Sinaloan milk-snakes from Mexico; New Guinea side-necked turtles, Travancore tortoises, blood pythons, and tentacled snakes from Asia. Donations included two Boelen's pythons — a striking-looking species introduced for the first time at the Bronx Zoo — and

Indian gharials at feeding time in JungleWorld.



amethystine, green tree, and Bismarck pythons, all native to New Guinea.

Head-starting programs involved two turtle species — 20 young Plymouth red-bellied turtles from the Massachusetts Division of Fisheries and Wildlife Nongame and Endangered Species Program and 50 Coahuilan box turtles. Of the 65 Coahuilan box turtles hatched so far at the Reptile House, 50 may be returned to their native Mexican habitat in the springs of Cuatro Cienegas.

Other acquisitions included six Aru Island black tree monitors from Indonesia, three Solomon Island prehensile-tailed skinks, six Egyptian spiny-tailed lizards, and three Indonesian mangrove monitors. A new conservatory was added to the west end of the Reptile House to allow natural lighting of the crocodilian exhibits and to establish a greenhouse for plants. The reticulated and diamond python exhibits were extensively remodeled, and new exhibits were fashioned for Boelen's pythons and for the snakes of Georgia's Okeetee Plantation, a snake-hunter's Mecca.

#### Staff activities

After 30 years with the Herpetology Department, Superintendent Peter Brazaitis was named Assistant Curator at the new Central Park Zoo. He has been joined there by Senior Keeper Bruce Foster, who was promoted to CPZ Superintendent. Bruce worked in the Herpetology Department for 16 years. Senior Keeper William Holmstrom was promoted to Superintendent, and Kathy Gerety to Senior Keeper.

Curator Behler and Superintendent Holmstrom joined National Park Service natural resources specialists in a novel project to reconstitute the reptile and amphibian communities once present in Gateway



Vietnamese box turtles in JungleWorld bred for the first time at the Zoo.

National Recreation Area, which spans about 26,000 acres in New Jersey and New York.

Behler continues to serve as coordinator of the Nixon Griffis Fund for Zoological Research. This year, thirteen projects from fourteen institutions were approved for funding. He was appointed to the Wildlife Conservation and Management Committee of the America Association of Zoological Parks and Aquariums and continues to serve as coordinator of the AAZPA's Crocodilian Advisory Group and as Deputy Chairman of the IUCN Tortoise and Freshwater Turtle Specialist Group.

#### Reptile and Amphibian Census, Bronx Zoo (as of December 31, 1987)

Amphibia orders	Families	Species and subspecies	Specimens in Zoo	Specimens owned
Caudata — Salamanders	2	5	11	11
Anura — Frogs, toads	8	21	58	56
<b>Totals</b>	<b>10</b>	<b>22</b>	<b>69</b>	<b>67</b>
Reptilia orders				
Chelonia — Turtles	9	44	295	294
Crocodylia — Alligators, caimans, crocodiles	2	10	112	180
Squamata (Sauria) — Lizards	9	25	79	86
Squamata (Serpentes) — Snakes	4	65	312	274
<b>Totals</b>	<b>24</b>	<b>144</b>	<b>798</b>	<b>834</b>

**N.B.** Specimens in Zoo include 125 on loan to the NYZS from other collections. Specimens owned include 159 on loan to other collections from the NYZS. There were 57 species listed as endangered, threatened, or vulnerable. Births and hatchings totaled 113.

## Wildlife Survival Center

### Maleo maternity

For several years the Center's staff has been working to solve captive breeding problems in this country's only collection of maleos, an endangered avian species from Indonesian Sulawesi. In nature, these large, fowl-like birds of the Megapodiidae family have unique methods of nesting and incubation. At communal sites in black sand beaches or deep in the rain forest next to geothermal vents the females lay single eggs to be warmed either by the sun or by natural steam.

Until recently, duplicating these conditions has been unsuccessful, although the Center's two females, with help from the one male, have consistently laid fertile eggs. This year, modified techniques for incubating reptile eggs were tried, and after eighty days in a sealed container a single egg hatched, producing the first maleo chick outside Sulawesi. With two additional eggs laid late in the spring, the captive maleo population promised to virtually double.

### Sandhills at large

The release program for sandhill cranes began in 1983, and each year this local species becomes more established on St. Catherines. In all, eleven birds in the release project have staked out territories on the island. Hatchings occurred for the first time this year, with two pairs producing four chicks. Only one survived, reflecting the high mortality rate in the wild, and it is being raised by parents that claim several hoofed stock pastures as part of their home range.

*This sable antelope calf was one of the nine born at the Center last year.*



Other notable hatchings in the bird collection included three yellow-knobbed curassows (the fourth species of curassow to be bred at the Center), two wattled cranes, two leadbeater cockatoos, and eight red-fronted macaws. With 53 chicks produced by three pairs since 1983, the Center is in the forefront of efforts to preserve the red-front, which was recently targeted for long-term captive management by the American Association of Zoological Parks and Aquariums.

### Proliferating primates

The free-ranging group of ring-tailed lemurs, released on the island in 1985, produced four babies during the year, bringing the total to 13 over three years. One was born to a female who was herself born in the wilds of St. Catherines in 1986.

With the Monkey House at the Bronx Zoo being renovated for smaller marmoset and tamarin species, six lion-tailed macaques, a gravely endangered species, were moved to the Center in October 1987. No more than 1,200 lion-tails are left in the Western Ghats of India, where deforestation continues to deplete their numbers. The group has already grown with the addition of a male offspring in March. This species, and a group of ruffed lemurs, will be involved in an innovative release project scheduled for fiscal 1989.

Primates and other mammals produced 53 offspring, including ruffed, black, and brown lemurs, parma wallabies, addra and slender-horned gazelles, Grevy's



Success in breeding the endangered maleo of Indonesian Sulawesi came after years of trying.

zebras, Jackson's hartebeests, Nile lechwe, Arabian oryx, and sable antelope.

#### Oryx odyssey

As part of the program to reintroduce the Arabian

oryx in the wild, the Center sent one male of the species, born on St. Catherines in 1986, to be released in Oman, where it will join 45 to 60 previously released oryx now roaming the Empty Quarter. Hunted to extinction in 1972, Arabian oryx are being restored through a program initiated by the Flora and Fauna Preservation Society and the Sultan of Oman, who is providing all financial support for the operation. Through the Species Survival Program (SSP) of the AAZPA, North American zoos will continue to provide ten animals a year for release.

#### The first 100

With a slight modification of social grouping, the Malagasy radiated tortoise breeding program hit full stride this year with 33 hatchlings. The new management scheme not only increased numbers — with offspring totaling 125 since 1981 — but enhanced the genetic management of the tortoise bale. Through cooperation with the Species Survival Plan and outside institutions, hatchlings were sent to several programs across the country, and the Center received several juveniles for recruitment into its breeding population.

Joining the Wildlife Survival Center staff were Brad Winn and Timothy Portillo as Zoological Technicians and David Florin as Aviculturist. Rebecca Skaine and Pamela Senger served as interns.

#### Wildlife Survival Center Census (as of December 31, 1987)

	Families	Species and subspecies	Specimens at Center	Specimens owned
<b>Mammalia orders</b>				
Marsupialia — Wallabies	1	1	10	13
Primates — Lemurs	2	7	49	35
Perissodactyla — Zebras	1	1	8	4
Artiodactyla — Antelope	1	6	76	68
<b>Totals</b>	<b>5</b>	<b>15</b>	<b>143</b>	<b>120</b>
<b>Aves orders</b>				
Ciconiiformes — Storks	1	1	6	4
Anseriformes — Screamers, geese	1	1	0	2
Galliformes — Pheasants	2	7	36	33
Gruiformes — Cranes, bustards	3	7	46	65
Columbiformes — Pigeons	0	0	0	1
Psittaciformes — Parrots	2	7	34	34
Coraciiformes — Hornbills	1	4	23	22
<b>Totals</b>	<b>10</b>	<b>27</b>	<b>145</b>	<b>161</b>
<b>Reptilia orders</b>				
Chelonia — Turtles	1	4	64	45

N.B. Specimens at Center included 69 on loan from other collections. Specimens owned included 61 on loan to other collections from the NYZS. There were 36 species listed as endangered, threatened, or vulnerable. Births and hatchings totaled 93.

## Animal Management Services

The growing obligation of zoos to manage, protect, and breed endangered species has created a demand and need for full and accurate animal records, specialized research, and greater collaboration among zoos. A new department, Animal Management Services, was formally established in 1987 at the Bronx Zoo, not only to administer the computerization of record-keeping, but also to coordinate the Society's intensive interzoo activities and aspects of its endangered species research.

### Animal Records

Bronx Zoo animal records are unusually complete and go back to the first acquisitions in 1899. Over the years, the amount and kinds of data collected on each specimen — daily keeper observations, medical, feeding, and breeding notes — have increased. It is not unusual for a single specimen to account for 30 pages or more of history. Animal reports are made available to curators, veterinarians, and other staff scientists and collaborators, as well as an ever-growing list of international and regional studbook keepers.

This information feeds into ARKS (Animal Record Keeping System) a computerized system run by the International Species Inventory System (ISIS) in Minnesota, which the Bronx Zoo helped launch and develop. Some 150 zoos worldwide now use ARKS. Animal Records also arranges animal shipping for interzoo exchanges, including USDI and USDA permits. In this twelve-month period, 166 shipments were handled.

### Library and Archives

Statistics suggest the scope of the year's Library services to all divisions of the Society. More than 100 new books and 800 issues of 190 journals were added to the library's 6,100 volumes last year. In response to staff requests, more than 125 books and articles were borrowed or copied from other libraries, and more than 150 computerized literature searches were conducted. Approximately 100 students and other non-NYZS researchers used the Library by appointment. The archives log lists 50 retrievals of correspondence, slides, and artwork, including material for the historical film on Wildlife Conservation International. The archives currently house over 900 linear feet of Society records.

A grant from the New York State Education Department funded purchase of a hygrothermograph for monitoring temperature and humidity in the collection storage rooms and flat file cabinets for architectural and other oversize archival records. The grant will also fund a preservation survey of the facilities

housing the library and the archival collections by the North East Document Conservation Center.

### Conservation Biology Research

For the third year in a row, the Institute of Museum Services funded conservation projects at the Zoo. To coordinate the IMS-sponsored program of captive breeding research, Dr. Michael Hutchins moved over from the Mammalogy Department and has begun to centralize logistical support for in-house and outside researchers and to implement priorities set forth by the newly established Zoological Research Committee (ZRC).

### Keeper Training

Virtually the entire scientific, curatorial, and supervisory staff of the Bronx Zoo now participates in keeper training, which has become as complex as exhibits, animal care, and breeding. Keeper trainees now attend 25 separate classes on subjects ranging from safety and nutrition to animal restraint. Animal Management has therefore taken on the job of coordinating the program and preparing training materials. During 1987-88, 24 keeper trainees went through the 22-week course.

### Staff activities

Curator Dan Wharton continued to serve as Species Coordinator of the AZPAs Snow Leopard Species Survival Plan, providing analysis and direction to 50 North American zoos maintaining this species. He was named North American Regional Studbook Keeper for the lowland gorilla this year and continues to administer the support of the Koala Artificial Diet Project (Dr. Ian Hume, Principal Investigator, University of Sydney).

Conservation Biologist Michael Hutchins co-organized and taught the Third Annual Applying Behavioral Research To Zoo Animal Management Workshop in Dallas. Sponsored by the Dallas Zoological Society, the workshop attracted nearly 30 participants representing fifteen zoological institutions.

Lorraine Perkins joined the staff in October as Zoologist. Formerly Registrar in the Atlanta Zoo, Ms. Perkins has nearly completed her masters degree in orangutan behavior at Georgia Tech. Records Clerk Nilda Ferrer graduated from Fordham University in data management and was promoted to Animal Records Specialist. Supervising Librarian/Archivist Steven Johnson began compiling a computerized bibliography on the translocation and reintroduction of endangered species. The bibliography will be made available to zoo biologists and other conservationists worldwide.

Clinically, the Animal Health Center's year was highlighted by expanded services to the Aquarium, inauguration of the new Central Park Zoo's clinic, and the addition of new drugs and equipment. Internationally, the department provided dramatic assistance on several projects. In reproduction and endocrinology research, Dr. Minu Chadhuri continued her study of gorilla reproduction and monitored such other animals as Asian rhinos, European ferrets, tapirs, and babirusas, providing invaluable predictions of pregnancy in most of these species. And in nutrition research, under Dr. Ellen Dierenfeld, great strides were made on several fronts.

### Nutrition news

With generous support from Trustee Shirley Katzenbach, Hoffmann-LaRoche, Inc., and Mrs. Wendy Fritz, several research projects in nutrition were initiated, and a laboratory technician, Jane McGuire, was added to the staff. New equipment, including a muffle furnace and an autosampler (the gift of Perkin-Elmer, Inc.) has increased the ability of the Nutrition Lab to provide analytical support for both field and zoo researchers.

Levels of vitamin E have now been measured in 121 mammal species, 71 birds, 12 reptiles, and one fish. Routine measurements of vitamin A and cholesterol are also now made in all blood samples so that relationships between fat-soluble vitamins can be better understood. Blood samples taken from mule deer, beluga whales, and caiman in the wild during various NYZS projects have been analyzed to establish norms for these species that can be used to interpret zoo data.

A major study was completed to determine the correct levels of vitamin E in quail feed that would ultimately be ingested by peregrine falcons consuming the quails. Managers of The Peregrine Fund in Boise, Idaho, report a record year in falcon reproduction, which they feel is strongly linked to diet changes implemented since last year. Levels of vitamin E have been examined in other raptors, including wild bald eagles and golden eagles, in which values are similar to those of falcons. This information is basic to recommended captive feeding programs for birds of prey and suggests the importance to carnivores of diets fed to prey species.

Mineral research is also underway. Preliminary feeding trials to examine the relationship between dietary iron and liver iron-storage disease (which affects birds of paradise and other frugivores in zoos) are being conducted with the help of zoo volunteers and student interns. Blood mineral levels are being

examined in captive and free-ranging hoofed stock and primates to determine how captive diets can be more accurately formulated and to better understand the use of soil and mineral licks.

Diet reviews and revisions continue for animals at the Bronx Zoo and have begun at the Central Park Zoo. A quality-control analysis of all loads of hay has been instituted, and several notable new commercial products have been successfully used during the past year. Included are a powdered hummingbird nectar and low-iron insectivorous-frugivorous bird diets.

### New drugs and equipment

Several anesthetics and tranquilizers were found to be helpful in keeping animals healthy during shipment to other zoos. One tranquilizer was especially effective, up to 48 hours, for nervous antelope. A research drug called Telazol, which the department has used successfully for 17 years, has finally become available commercially. Its application in the Zoo will now be expanded beyond a few rare species. This product has also proved to be well suited for field study use, primarily because of its safety and exceptionally fast affect. The development of specific dosages for a variety of species will be helpful in field research.

A new serum autoanalyzer from the Technicon Corporation measures such serum components as cholesterol and sugar, based on very small samples, permitting the assessment of various organ functions. This expansion of testing capabilities speeds treatment and helps establish norms for many small animals that had been previously difficult to evaluate.

Other new pieces of equipment also benefit the clinical program. An ultrasonic dental cleaner is as effective with some animals as it is with humans. An electrocardiograph for monitoring and evaluating heart function during surgery has a battery pack and can be used in the field and at the Zoo. And surgical procedures on any of our smallest animals can now be performed under an operating microscope donated by the Zeiss Company. For instance, the torn wing of a bat was closed with two layers of fine suture material although the wing was no thicker than a sheet of paper.

### The Aquarium and the Central Park Zoo

In February, Nuka, a five-year-old walrus at the New York Aquarium, developed a lesion on her upper jaw. Dr. Robert Cook, with the assistance of Dr. Lynn Klein, a veterinary anesthesiologist from the University of Pennsylvania Veterinary College, performed a three hour reparative surgery using general anesthesia. The procedure was successful and Nuka continues to provide enjoyment for all who visit the Aquarium.



**Nutritionist Dr. Ellen Dierenfeld tries out a new diet on a tamandua.**

The veterinary program at the Aquarium has expanded during the past year. Technical support, laboratory facilities, and a small clinic area have all helped improve on-site medical care. Fish medicine is a new research area for the veterinary staff, and Dr. Cook hopes to complement the efforts of Aquarium Pathologist Dr. Paul Cheung in providing more sophisticated care for the Aquarium collection. During the past year, the development of anesthesia techniques for fish enabled Dr. Cook to surgically remove a tumor from a South American lungfish.

The completion of the Central Park Zoo's veterinary clinic in April coincided with the arrival of animals at the Animal Health Center for quarantine. The new clinic has facilities for medical care and some surgery and laboratory use. Larger animals and those in need of more sophisticated therapy will be moved to the Animal Health Center at the Bronx Zoo.

#### **Vets abroad**

Each staff veterinarian participated in a recent field project. Dr. Cook joined the expedition to capture a female beluga whale near Churchill, Manitoba in Canada for the Aquarium's breeding program. Once in captivity, the whale was carefully monitored on a

daily basis through blood tests and physical exams to insure its good health. Microbiological, serological, and nutrition tests were also done from ten additional whales to help broaden understanding of the wild population, and guide the captive animal health program for this species.

Pathologist Dr. Tracey McNamara was called upon to assist in diagnosing a disease that was devastating the hippopotamus population in Zambia's Luangwa Valley. Her prompt identification of anthrax, a highly infectious disease of animals and humans, assisted the government in developing a management plan, and may even have saved human lives.

Chief Veterinarian Dr. Emil Dolensek also went to Africa. In Zaire, he assisted WCI researchers John and Terese Hart in capturing study animals for their okapi project. For the first time, he developed safe immobilization procedures for use on this rare species in the field and in captivity at the Epubu Station. Blood and serum specimens were drawn from eleven okapi. Dr. Dierenfeld can now compare the data on captive and free-ranging okapi to determine whether differences exist in their vitamin and mineral levels.

## Zoo Education

### Getting the word out

For several years, the department has been challenging school systems in New York and around the world to incorporate wildlife studies as part of the school curriculum. The process of initiation and persuasion now involves conferences, lectures, teacher training, and publications that involve thousands, and ultimately millions of people in learning and caring more about their natural environment.

In March 1988, using as a reference its nationally acclaimed *WIZE* program — *Wildlife Inquiry through Zoo Education* — the department, with a grant from the New York State Council of the Arts, convened a statewide conference at the Bronx Zoo titled "The Use of Living Collections in the School Curriculum." For three days, teachers, curators, and administrators representing school systems, aquariums, botanical gardens, nature centers, and zoos addressed such issues as the use of living collections in education, involvement of the community, cooperative programs, and funding.

The Zoo also hosted meetings for the Council of Supervisors and Administrators, representing principals and assistant principals in New York City's 32 school districts, and for several PTA executive boards, to detail the benefits of zoo instruction.

The effort also carried beyond the Zoo. In conferences at Hunter College and Cornell University, Curator

Annette Berkovitz delivered lectures on bringing rain-forest studies to the classroom. Assistant Curator Douglas Falk promoted the educational use of zoo collections at conferences of the Nassau County science supervisors and the Association of Teachers in Independent Schools. And Senior Instructor Donald Lisowy delivered a lecture at New Jersey's Institute of Technology in the first national conference on pre-college education for minorities in science and engineering.

### Teachers: A priority audience

In the promotion and dissemination of environmental education, teacher training has come to play an essential role. During the academic year, a 45-hour program called *ZEST* — *Zoos for Effective Science Teaching* — was held for the second year at the Zoo with funding by the National Science Foundation. Junior high and secondary school teachers from the metropolitan tri-state area attended the eight sessions between January and April. The summer program, supported by the Geraldine R. Dodge and Moore foundations and certified for accreditation by New York City's In-Service Bureau and local universities, hosted 75 participants from around the country in 1987 and expected more than 100 in 1988. In both programs, teachers enhance their professional skills and learn how to include in their science curricula such ecological issues as human impact on the environment.

Zoo Camp introduces children to the wildlife of five continents.



and zoo-sponsored efforts to save wildlife.

For the week-long summer sessions, teachers are encouraged to attend in the company of their local zoo educators, to foster zoo-school relationships. The program has already welcomed staff from such large, highly respected institutions as the San Diego Zoo and the National Zoological Park in Washington, D.C. and from such smaller zoos as the Van Saun Park Zoo in New Jersey and the Rochester Museum and Science Center. Mr. Seikor Bundu, Science Curriculum Development Officer in Sierra Leone's Ministry of Education, also attended in summer 1987.

#### Elementary foundations

Zoo programs for younger schoolchildren continue to reach larger audiences. "Windows on Wildlife" (WOW) provides students in grades 3-6 zoo-based lessons on habitat ecology and endangered species. Fully booked by metropolitan area schools more than a year in advance, the program increased its enrollment by 25 percent in 1987, with new participation by school districts in Yonkers, Scarsdale, and Manhattan's Upper West Side.

Similarly, "Animals Near and Far," an introductory program on the biology and behavior of mammals, birds, reptiles, and amphibians for kindergarten through third-grade classes, increased its attendance by 70 percent in 1987. The aim of both series is to instill positive attitudes about wildlife at an early age, to prepare youngsters for the more sophisticated lessons of ecological preservation that hopefully will come later on. It is especially encouraging that many school principals opted to increase the number of sessions for which each class was enrolled.

Elementary level offerings will be expanded in the 1988-89 school year with a new series for children ages five through seven. Piloted, tested, and refined for two years in collaboration with children in the Bronx's P.S. 205 and 30 teachers from New York City schools, the program will teach essential observation skills by focusing on animal shapes, textures, colors, sounds, movements, diets, and homes. Funding was provided by the New York State Council on the Arts, The Samuel and May Rudin Foundation, Inc., the Liz Claiborne Foundation, and the Louis Calder Foundation.

#### Publishing projects

Accompanying the new program will be a teacher training component with six illustrated activity books and a sound cassette titled *Pablo Python Looks at Animals*. Developed by the education staff working with artists and designers, these books will be available to parents as well as teachers interested in establishing an early foundation for wildlife learn-



The week-long summer ZEST program (Zoos for Effective Science Teaching) attracts educators from the U.S. and overseas.

ing. A national publisher for the series will be sought once the program is underway.

A contract was signed in late 1987 with Beacham Publications in Washington, D.C., to publish *Survival Strategies*, the second module of the award-winning Project WIZE. This multifaceted package of materials, which has been tested in fourteen states with thousands of students, is an advanced high school wildlife and environmental curriculum. The sequence of lessons teaches population biology and other complex ecological principals as well as decision-making skills concerning the environment. In 1988, the National Diffusion Network, an arm of the U.S. Department of Education, placed *Survival Strategies* on its list of validated programs and recommended it to science facilitators in all 50 states.

Module I of WIZE, *Diversity of Lifestyles*, which lays the foundation for studies in community ecology, was published in 1985 and is used in hundreds of junior high and high school classrooms throughout the United States. Project WIZE was named one of the six best science programs in the country by a National Science Foundation commissioned study in 1986.

#### General audience courses

Some 60 courses at the Zoo enrolled 32,834 participants, from toddlers through adults, an increase of 21 percent over the previous year. Another 395,002 students and campers came to the Zoo in 11,286 organized groups for self-guided tours, many assisted by materials published and provided by the department.



Instructor Noreen Jeremiah conducts a demonstration class for ZEST participants in JungleLab.

Several classes drew on the experience and expertise of NYZS staff members. Chief Veterinarian Dr. Emil Dolensek and Senior Animal Health Technician Judith Duffelmeier discussed the care of zoo infants in "Bringing Up Baby." Chairman of Ornithology Donald Bruning explored the challenges of restoring endangered species to nature in "Saving Birds from the Bronx to Bali." And Deputy Director for Design John Gwynne and Audio-Visual Specialist Tom Veltre taught "Zoo Exhibition: An Art or a Science?"

New courses during the year included "Gorillas," "Animal Nutrition," "Family Planning in the Animal Kingdom," "Hope for the Future," "Animal I.Q.," "Parenting in the Animal Kingdom," "Diversity: Saving All the Parts," "Animal Altruism," and "Equus." "Zoolab: A Family Discovery Center," open free of charge to families on selected weekends, served more than 2,000 individuals and included a special series on giant pandas during their visit.

Teaching facilities have been stretched to the limit with the growth of education programs in recent years, and it is apparent that a major new Education Center is urgently needed to accommodate the expansion of programs and services in several priority areas. In response to the Society's long-range planning effort, the education staff has begun to conceptualize a new center, which would include a modern auditorium, zoolabs, specialized classrooms, a teacher resource center, and new headquarters for the Friends of the Zoo.

#### Volunteer power

Attired in distinctive new red cobbler aprons or bright red shirts, the Friends of the Zoo were more visible throughout the park during the year and better able to assist visitors. These dedicated, trained volunteers gave tours to 10,313 schoolchildren on weekdays and 2,347 visitors ranging from Cub Scouts to garden club members on weekends. The special group of outreach guides visited 2,655 adults and children confined to nursing homes and hospitals and also participated in the Very Special Arts Festival for hundreds of handicapped children at the Roberto Clemente State Park.

FOZ forged a new liaison with the Department of the Aging's Stay Well in the Park program. Participating seniors explore four different areas of the Zoo with FOZ guides and pause along the way for their fitness program exercises.

FOZ volunteers also worked 6,000 hours interpreting exhibits in the Children's Zoo, assisting Zoo instructors. Some helped at the Animal Health Center, particularly as babysitters for Cleo, the baby hippo, and others tabulated important conservation biology data for the Animal Management Services department.

#### Media power

Working with Wildlife Conservation International and the Public Affairs Department, Audio-Visual Specialist Tom Veltre produced a 25-minute film on the history and philosophy of the Society's field research and conservation program. Titled *Wildlife Conservation International: The Evolution of a Commitment to Conservation*, the film features footage of NYZS field biologists from the National Geographic Society, the BBC Natural History Unit, Survival Anglia Ltd., and the Society's own archives, including clips dating back to the turn of the century. Since its premiere at the 1988 Annual Meeting, the film has been re-edited for transfer to videotape and will be used for educational and promotional purposes throughout the Society.

The Society's film archive also provided footage for productions by WNET/Channel Thirteen, The Christophers, Children's Television Workshop, CBS News, National Geographic Explorer, and the WQED/National Geographic Centennial Special, among others.

Work was underway on sound effects and videodisc installations for exhibitions in the new Central Park Zoo's Polar Circle and Tropic Zone, and preliminary shooting was begun for a video documentary on ZEST — Zoos for Effective Science Teaching — which will be disseminated to zoos and other cultural institutions in the United States for teacher training.

**The Children's Zoo, camel rides, and wildlife demonstrations**

Nearly 580,000 visitors climbed and slid their way through the 3.5-acre Children's Zoo in fiscal year 1988. The adventure ends in the popular domestic area, where many inner-city visitors experience their first close contact with living creatures other than cats and dogs. This year, a new goldfish exhibit was added here to illustrate concepts of domestication and selective breeding.

The Children's Zoo Theater, funded by a grant from the Mobil Foundation, instructs and entertains about 60,000 visitors each season, and provides feedback from audiences that allows staff to evaluate the impact

of exhibits. Five shows daily review the concepts of animal homes, locomotion, senses, and defenses, using live animals from foxes to porcupines.

The department's other theater, in Wild Asia Plaza, focuses on conservation principles and the devastation of wild animal populations, particularly by habitat destruction and the pet trade. Support from the Louis Calder Foundation has been crucial in making this program available to a yearly audience of about 50,000 visitors.

Also in Wild Asia Plaza, more than 85,000 visitors enjoyed rides aboard the Zoo's dromedary camels.

**Children's Zoo Animal Census, Bronx Zoo (as of December 31, 1987)**

	Families	Specimens and subspecies	Species at Zoo	Specimens owned
<b>Mammalia orders</b>				
Marsupialia — Kangaroos	1	1	2	2
Insectivora — Hedgehogs	2	2	2	2
Edentata — Armadillos	2	2	2	2
Lagomorpha — Rabbits	1	2	38	38
Rodentia — Mice, porcupines, etc.	4	7	18	18
Carnivora — Foxes, ferrets	4	7	28	28
Perissodactyla — Horses	1	2	5	5
Ariodactyla — Goats, sheep, camels, etc.	3	6	28	26
<b>Totals</b>	<b>18</b>	<b>29</b>	<b>123</b>	<b>121</b>
<b>Aves orders</b>				
Ciconiiformes — Herons	1	4	11	11
Anseriformes — Ducks, geese	1	10	83	83
Falcoformes — Falcons	1	1	4	4
Galliformes — Chickens	1	3	44	44
Columbiformes — Doves	1	3	5	5
Psittaciformes — Parrots	2	8	7	5
Strigiformes — Owls	2	3	5	5
Caprimulgiformes — Frogmouths	1	1	1	1
Passeriformes — Perching birds	1	1	1	1
<b>Totals</b>	<b>11</b>	<b>34</b>	<b>161</b>	<b>159</b>
<b>Amphibia orders</b>				
Caudata — Salamanders	2	2	11	11
Anura — Frogs, toads	3	3	16	16
<b>Totals</b>	<b>5</b>	<b>5</b>	<b>27</b>	<b>27</b>
<b>Reptilia orders</b>				
Chelonia — Turtles	3	10	40	40
Crocodylia — Alligators	1	1	5	1
Squamata (Sauria) — Lizards	2	4	9	9
Squamata (Serpentes) — Snakes	3	8	26	29
<b>Totals</b>	<b>9</b>	<b>23</b>	<b>80</b>	<b>76</b>

**N.B.** Specimens in Zoo include 10 on loan to the NYZS from other collections. There were 22 species listed as endangered, threatened, or vulnerable. Births totaled 43.

## Exhibition and Graphic Arts

### Of mice and elephants

The Zoo's Small Mammals House first opened in 1904 and has since undergone a number of renovations, always emphasizing small exhibits for small animals that cannot be seen in other contexts. Redesigned as MouseHouse, the building's latest transformation reflects current concerns with habitat, conservation, education, and thematic coherence.

Glass-fronted environments were created by the exhibition staff for 43 species of mice, rats, and other rodents, using golden-toned grasses, painted bamboo, climbing vines, rock formations, and mural backdrops to simulate four characteristic biomes — grasslands, tropical forest, deserts, and temperate woodlands at night. A new system of rear-lit graphics on the ecology and biology of each species and area was tailored to the specific lighting requirements of the habitats.

Work by the City's contractors on Phase II of the Elephant House renovation resumed in spring 1988 after eighteen months of delay due to contractor default. When it reopens as the Keith W. Johnson Zoo Center, this beaux-arts palace will once again house elephants and rhinos, but in greatly improved indoor and outdoor exhibits designed by architects Goldstone & Hinz. In their new landscape habitats, designed by Coe and Lee, rhinos will be seen through lush canebreaks and elephants through vine-tangled woodland glades resembling an Asian temperate mon-

soon forest. The Zoo's information center and interpretive galleries on elephant and rhino biology, ecology and conservation will occupy the interior, along with the animals themselves during the winter months.

### Highlands and wetlands

Construction of a new exhibition and visitor area in the African Zone, designed by the department's exhibition staff, began in spring 1988. The 1.5-acre re-creation of high-altitude grassland will be inhabited by a breeding population of rare and spectacular gelada baboons and by other indigenous Ethiopian wildlife. These fascinating, socially active animals will be seen from various vantage points around the perimeter, including a prototype researcher's field station and viewing blind within the habitat and a field lab for special courses in savanna wildlife and ecology. This exhibition classroom will be named for the late NYZS Trustee, Charles W. Nichols, Jr.

Curving around the foot of the gelada highlands will be a public plaza in the form of a West African village, with replicated mud-and-thatch buildings to house visitor orientation, food and sales, and changing exhibition areas. The plaza will also overlook the African Plains to the south.

Another City-Society funded project now underway is renovation of the international wildfowl pond, renamed the John Pierrepont Wildfowl Marsh.

Gelada baboons on an Ethiopian highland plateau will be seen from an African village plaza. Construction is underway.





The Zoo's new Nursery and Browse Center provides food for animals and plants for exhibitions.

Extended wetlands, with marsh grass, cattails, iris, and native wildflowers, will provide a fitting habitat for ducks, geese, and swans. Hidden pumps and special filtration systems are designed to conserve and filter water biologically.

#### Graphic achievements and exhibition honors

To ensure stylistic uniformity in publications, letterheads, and other graphic products, a definitive style manual was prepared to provide guidelines for graphic and editorial practice, including the use of the new impala logo. Designs were produced for invitations, brochures, SSP studbooks, Tshirts, and hundreds of new signs at the Zoo and Aquarium, while the process of re-screening Asia Plaza's graphics was begun. Assistance was also provided on the Central Park Zoo interpretive graphics program and the fabrication of exhibits.

For the second year in a row the Society received the AAZPA's top exhibition award, this time for the Zoo's

Himalayan Highlands, which was also honored by *PRINT Casebooks*, the premier international design magazine, as one of the year's 25 best exhibits (out of more than 3,000 international projects submitted).

#### Horticulture

Maintenance of the Bronx Park's tree cover, one of the City's last areas of mature forest, was intensified in the face of extreme summer conditions and the devastating spread of Ash Decline. Protocols were established in the last phase of the Integrated Pest Management program (IPM) supported by the Norcross Wildlife Foundation. Two weeks of tree work by outside contractors and the fertilization of more than 120 large trees, including many 150-year-old oaks, helped combat stresses caused by heat and drought. Answers to the ash problem, which has struck throughout the eastern United States, are still being sought. Ash trees are one of the three most abundant species in the closely monitored Bronx

Zoo forest, representing twelve percent of the currently studied 13,800 trees. In view of the broad negative impact their loss will have, forest restoration plans are being prepared.

Norcross also financed Phase II of the Plant Nursery and Browse Center, which helps meet the nutritional needs of a variety of animals at the Zoo without stressing the park's plant resources and using keeper time to collect browse. In addition, hardy perennials planted at the Center can now be grown to large sizes, enhancing their chances of survival in animal exhibits.

The Horticulture Internship Program has been extremely successful. Two interns supported by Norcross and by the Lowenstein Foundation worked on projects that ranged from testing animal repellents on plants and observing the reaction of animals to aromatic herbs to monitoring the effectiveness of beneficial insect releases as a method of controlling

plant pests in tropical exhibits.

Exhibition work included advice on developing media and planting techniques for the living green wall experiment at the Central Park Zoo's Tropical Zone Building. At the Bronx Zoo, the planting of such thorny African-type plants as *Poncirus trifoliata* and *Yucca glauca* helped improve visitor viewing and safety. A 50-ton crane was used to plant large locust trees in the habitat around the Carter Giraffe Building and an ironwood tree in the Children's Zoo. The horticulture crew also struggled with winches and old-fashioned muscle-power to plant 30-foot-tall fig trees and large palms in JungleWorld, and large cypress trunks were installed in the totally renewed Swamp exhibit in the Aquatic Birds building. At the other extreme, the smallest details, such as mosslike *Selaginella*, were added to the microhabitats of insects in JungleWorld's Unseen Multitude Gallery.

Visitors will able to enter the John Pierpont Wildfowl Marsh for a close view of ducks, geese, and swans in their natural environment.



## Operations — Construction and Maintenance

### Energizing the Zoo

The Cogeneration and District Heating project that will reduce energy costs and largely replace the Zoo's antiquated electrical and hot water systems was 65 percent complete by June 30. Dual-fueled generators were installed at the Cogeneration Building adjacent to JungleWorld on the Bronx River. Trenching for the medium-temperature, hot-water distribution piping and electrical conduit was achieved with minimal disruption to Zoo activities, and major accessory equipment was being installed by tradesmen.

Meanwhile, the energy-conservation project was nearing completion, with a new heating system being installed in the Great Apes House and new storm windows about to be furnished for several key Zoo buildings. New boilers for the Reptile House, Administration Building, and Heads and Horns Building were to be ready for the winter season of 1988-89.

### Major new animal exhibitions

Work on the second phase of the Elephant House renovation — the creation of outdoor exhibition areas for elephants and rhinos — resumed at accelerated rate after a delay caused by contractor default. The elephants' pool, rhino wallows, and moats to separate animals from public were well under way. With new lighting and cleaned Guastavino tiled vaults and domes, the imposing interior has been thoroughly renovated and awaits only the installation of interpretive galleries and the arrival of the animals. The third phase of the joint City-Society project — a major plaza on the building's south side — was scheduled to start in early fall of 1988. The entire complex will be called the Keith W. Johnson Zoo Center.

Heavy construction began in fall 1987 on the former Mountain Sheep Hill, west of the World of Darkness, where the African Plaza and an unusual outdoor exhibit for gelada baboons and other Ethiopian wildlife are being created. The City-funded portion of the project was expected to be completed by the end of 1988. Work will then begin, with NYZS funds, on landscaping and artificial rocks for the exhibition, food stands, the Veldt Lab classroom, and interpretive exhibits.

### Renovations and improvements

The Wildfowl Pond is undergoing extensive rehabilitation. Renamed in honor of NYZS Trustee John Pierrepont, the re-landscaped and rebuilt waterfowl exhibit, extended into a lushly planted marsh environment, was scheduled for completion in 1989.

At the World of Birds a City contractor began to

remedy the effects of wear and tear. A new roof, extensive waterproofing, new public flooring, and painting will spruce up this popular exhibit.

Some smaller projects were completed at the Zoo. The Mammal Center, housing the Mammal Department supervisory staff, was opened this spring in the former Animal Hospital. The Small Mammal House was refurbished, mostly by Zoo staff, and reopened as the MouseHouse. The Panda Exhibit was closed last November, and all temporary exhibit and public facilities were removed.

### Future projects

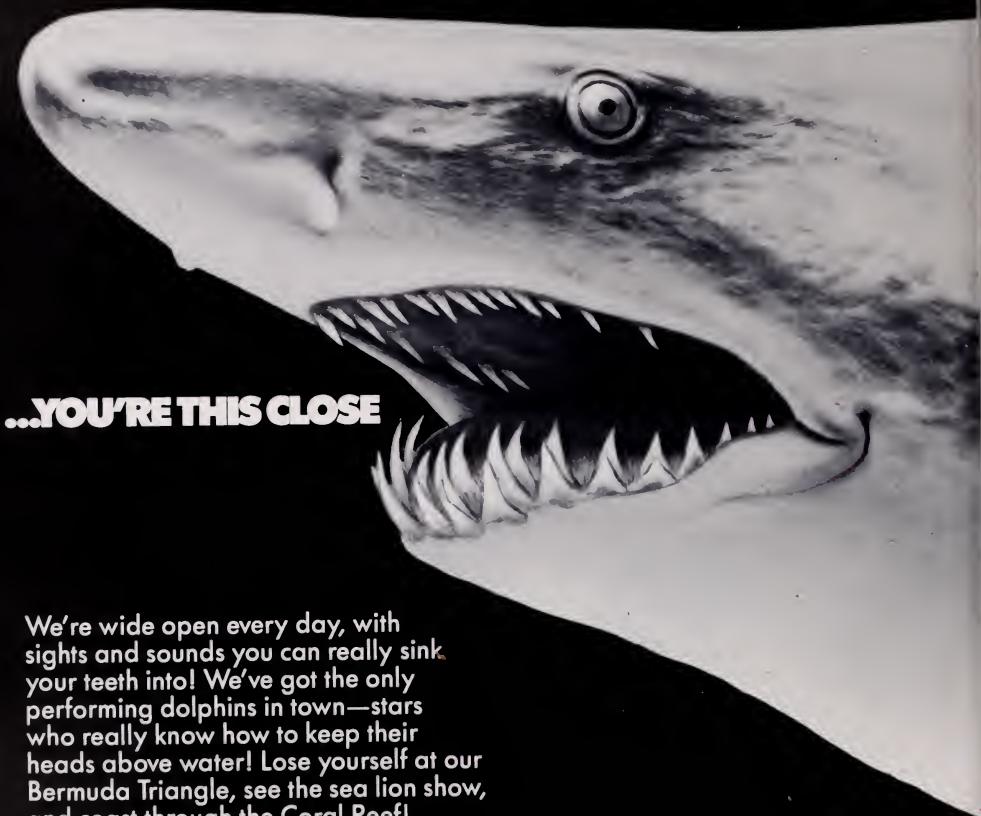
Several City-funded capital projects were scheduled to start shortly. These include a water-main extension along Boston Road that will alleviate water-pressure problems at the World of Birds, and the repaving of the Crotona and Asia parking lots. Replacement of the Carter Giraffe Building roof is scheduled to start in fiscal year 1989.

Plans for a new Society-funded cafeteria are well advanced, and the architectural firm of Davis, Brody and Associates, selected to design the renewal of Astor Court, has begun to produce schematic designs.



Three enormous dual-fired generators housed on the Bronx River will drive the Zoo's new Cogeneration and District Heating System.

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The New York Zoological Society is...The New York Aquarium, The Bronx Zoo, Wildlife Conservation International, Osborn Laboratories of Marine Sciences and St. Catherines Wildlife Survival Center.



# New York Aquarium

Dr. George Ruggieri's death on December 1, 1987, represents a great loss for the Society, the Aquarium staff, and the Coney Island community. Dr. Ruggieri first came to the Aquarium in 1958 to conduct research for his doctoral thesis. As Director of the Osborn Laboratories of Marine Sciences since 1973 and the Aquarium since 1976, he helped guide these sister institutions into a new era of scientific, educational, and popular effectiveness. Discovery Cove, one of several important projects planned and begun in his final years, will be named in Dr. Ruggieri's honor, with the octopus, his favorite animal, as the building's symbol.

Succeeding Dr. Ruggieri as Director of the Aquarium is Louis E. Garibaldi, who as Associate Director since 1983 has played the major role in planning Discovery Cove and other major exhibitions. He will be piloting an Aquarium that is being transformed by more compelling, educational exhibitions and greater emphasis in its scientific programs on the protection of endangered aquatic organisms and resources, particularly those of New York's deteriorating waterways.

## Underway and about to begin

Discovery Cove will be one of the centerpieces of the changing Aquarium. Work is at the halfway point on this journey through coastal environments, specialized live animal exhibits, interactive devices, and audio-visual displays, and construction of the interior exhibits is scheduled to begin in the fall for a 1989 opening. The Aquarium's Education staff is working closely with designers Frank Zarumba and Dick Lyons on many innovative exhibition concepts that stress the dynamics of multigenerational learning.

The construction of Sea Cliffs, another major project to be financed jointly by City and private funds, will probably get underway in early 1989, after the bidding process has been completed. This spectacular sequence of coastal habitats for seals, walruses, sea otters, and penguins will have outdoor and indoor walkways with views of the animals from above and below water level. Related exhibits and graphics will stress ecological issues and the importance of preserving these fascinating creatures of land and sea. Together, Discovery Cove and Sea Cliffs will more than double the number of Aquarium exhibits.

## From the Caribbean to the Red Sea

Expeditions around the world helped to introduce several new exhibits and renew established ones. In July 1987, Curator Dr. Erwin Ernst joined with CEDAM (Conservation Education Diving Archeology Museums) International to collect fish in the Carib-

bean off Honduras. He returned with queen angel-fish, rock beauties, bluehead wrasses, parrotfish, butterflyfish, yellowtail damselfish, black durgons, indigo hamlets, coneys, trumpetfish, harlequin bass, goatfish, and giant Caribbean anemones, all of which were added to the Bermuda Triangle exhibit. In September, Dr. Ernst traveled with CEDAM to the Red Sea, following up his trip of a year earlier to collect for the Aquarium's new Red Sea exhibit. The colorful new additions included bird wrasses, long-nosed butterflyfish, striped damsels, sailfin tangs, and green chromis.

NYZS Trustee Nixon Griffis continued his important contributions to the Aquarium collections with a group of killifish, pinfish, croakers, mullet, gobies, sheepshead minnows, and juvenile pipefish from northern Florida, and giant freshwater shrimp from the Rio Grande near Brownsville, Texas. The latter were added to the Primitive Fish exhibit in the Main Hall. Special equipment developed with backing by Nixon Griffis was used to collect fish and invertebrates at depths up to 3,500 feet in the waters around Bermuda. This technology will be used to populate a unique Deep-Sea Exhibit now being developed for the Aquarium.



Rio Grande shrimp, a large freshwater species, were among the acquisitions of Trustee Nixon Griffis.



Baby harbor seal Bernie, named for long-time Aquarium friend and photographer Louis Bernstein (right), makes his public debut in the care of Senior Keeper Dennis Aubrey.

As part of a cooperative captive breeding effort, an Aquarium team combined with personnel from Baltimore's National Aquarium and Mystic's Marine Life Aquarium to bring in several beluga whales from the Churchill River in Manitoba, Canada. Marina, a nine-foot female, brings the number of belugas at the Aquarium to five. Four females from the National Aquarium were residents of the 180,000-gallon Oceanic Tank for seven months while their tank in Baltimore was being renovated. One of the females remained at the Aquarium on long-term breeding loan.

An Aquarium team, headed by Mr. Garibaldi, participated in the search for the mysterious coelacanth off the Comoro Islands near Madagascar. Study of the physiology and behavior of this rare, primitive fish, which has been caught by fishermen but never kept alive, might provide clues to the evolutionary development of aquatic organisms. During his stay in the Comoros, Mr. Garibaldi also collected flashlight fish (*Photoblepharon palpebratus*), which were placed in an Aquarium tank designed to highlight their intimate symbiotic relationship with luminous bacteria.

#### New exhibits and facilities

Several small exhibits were installed or renovated during the year. In the Main Hall, a tank was introduced for archerfish, which shoot down their insect prey with water, and the exhibit of symbiotic clownfish and anemones was renewed. Also new is the California Rocky Coast, with rockfish, chili peppers, anemones, and a wave action tide pool in the Cold Marine Gallery.

To accommodate the growing animal collection and visitor attendance, which totaled 775,680 in fiscal 1988, a number of improvements were made in Aquarium facilities. The new Seawater Intake System, which by using water from the adjacent Atlantic Ocean will increase the capacity and quality of Aquarium exhibition, has begun to operate. The stage and seating capacity of the Aquatherater were increased by 30 percent. A new Animal Records and Treatment Facility was added to expedite marine mammal examination and enhance veterinary care. And a new aeration tower was built to increase dissolved oxygen and improve water clarity and quality in the shark tank.

#### Breeding, animal exchanges, and rescues

Breeding occurred Aquarium-wide. A harbor seal named Bernie, in honor of long-time Aquarium friend and photographer Lou Bernstein, was born in May 1988. Several hundred assorted cichlids hatched in the African Rift Lake exhibit. Six giant Australian seahorses were born and several dozen pipefish hatched in the Cold Marine Gallery. Fourteen black-footed penguins hatched in the hutches of the Penguin Pool Clownfish hatched on four different occasions, and northern puffers spawned several times. Hundreds of the latter were produced when their eggs were placed in the hatching tank.

Exchanges with other institutions included desert gobies sent to and cuttlefish, arowana, and arapaima received from the Steinhart Aquarium in San Francisco. Electric stargazers went to the Seattle Aquarium, and giant Japanese spider crabs came from the National Zoo in Washington, D.C.

Two stranded seals, a harbor seal and a harp seal, the latter far south of its usual territory, were rescued from Long Island beaches by Aquarium keepers. After several months of rehabilitation in the Marine Mammal Holding Facility, the seals were returned to the ocean near Montauk Point on May 25, 1988.

#### Aquarium Education

Marine science programs for the general public and for students from kindergarten through college enrolled 24,314 participants in 836 sessions at the Aquarium and local beaches. A variety of weekend programs attracted 2,347 children and adults. And workshops on using the Aquarium as an education

resource were conducted for more than 225 teachers. New York School Districts 21, 22, 27, and 29 participated in special workshops designed to meet the individual needs of their student bodies.

A number of other programs strengthened ties with New York City schools. As part of the Board of Education's Speaker in the Classroom Program, Instructor Merryl Kafka visited several elementary schools and introduced 4th- through 6th-grade students to the aquatic subjects through hands-on experiences. For her work she received an award from the Board's Division of Curriculum and Instruction.

The Adopt-A-Class program brought a seventh-grade class from Shellbank Junior High School to the Aquarium for eight two-hour sessions throughout the school year. Meetings with keepers, trainers, lab technicians, and curators, as well as tours, talks, films, and lectures gave students an insight into different occupations and grounding in how the Aquarium operates.

Another junior high school program informed economically disadvantaged students from JHS 50 in

District 14 about marine-related careers. Accompanied by Aquarium instructors, the students visited the marina facilities and campus laboratories of Kingsborough Community College. They also learned about careers in the seafood industry through the Fisheries and Marine Technology program.

This year's New York State Marine Educators Conference, held in May 1988 at Southhampton College, was co-chaired by Assistant Curator Ellie Fries and Merryl Kafka. Aquarium Director Louis Garibaldi's keynote address to the 200 attendees on conservation education was followed by a broad spectrum of papers and presentation.

The summer Docent Program recruited 61 high school and college students for intensive training by the Education staff. Stationed at ten major exhibits around the Aquarium, these enthusiastic young people answered questions and provided information to thousands of visitors each day. Awarded the Exxon Grant for 1988 to oversee the program was Linda Wolfe, a student in environmental studies at St. Johns University.

A harp seal is returned to the Atlantic at Montauk Point after months of rehabilitation at the Aquarium's Marine Mammal Holding Facility.



**New York Aquarium Census (as of June 30, 1988)**

<b>Phylum</b>	<b>Class</b>	<b>Order</b>	<b>Species</b>	<b>Specimens</b>
Chordata	Chondrichthyes — Cartilaginous fishes: Sharks, rays, chimeras	Heterodontiformes — Horn sharks Squaliformes — Typical sharks: Sand tigers, lemons Rajiformes — Rays	1 4 2	1 15 7
	Osteichthyes — Bony fishes	Acipenseriformes — Sturgeon, paddlefish Semionotiformes — Garfish Amiiformes — Bowfin Elopiformes — Tarpon, bonefish Anguilliformes — Eels, morays Anarrichadidae — Wolf eels Salmoniformes — Trouts Cypriniformes — Minnows, carp Characidae — Piranha, pacu Siluriformes — Freshwater catfishes Plotosidae — Coral catfish Batrachoidiformes — Toadfishes Lophiiformes — Frogfish Beryciformes — Squirrelfishes Gasterosteiformes — Seahorses, pipefish Perciformes — Perches, sea basses, porgies, cichlids	2 2 1 1 11 1 1 3 7 3 3 1 1 1 1 1 123	14 9 6 4 17 5 18 58 32 9 90 49 3 21 11 1,316 18
		Tetraodontiformes — Puffers, boxfish, triggerfish Dipnoi — Lungfishes (South American) Protopteroidea — Lungfishes (African)	13 1 1	48 3 1
	Reptilia	Chelonia — Sea turtles Freshwater	2 3	10 4
	Aves	Sphenisciformes — Penguins	1	54
	Mammalia	Pinnipedia — Seals, sea lions, walrus Cetacea — Whales, dolphins	4 3	17 8
Cnidaria	Anthozoa — Corals, anemones		25	numerous
Annelida	Polychaeta — Marine worms		1	500
Arthropoda	Crustacea — Lobsters, shrimps, crabs, isopods, etc. Arachnida — Horseshoe crab		13 1	98 30
Mollusca	Gastropoda — Snails Pelecypoda — Bi-valves Cephalopoda — Octopus, nautilus, cuttlefish		5 2 3	300 200 17
Echino- dermata	Asteroidea — Starfish Holothuroidea — Sea cucumbers Echinoidea — Sea urchins		15 2 5	49 15 104
	<b>Totals</b>		<b>275</b>	<b>3,161 +</b>

# Osborn Laboratories of Marine Sciences

## Regulating the regulators

The complex genetic mechanisms that determine whether a fish will be female or male is being explored in Dr. Klaus Kallman's ongoing work with generations of killifish and platyfish. The fact that stocks of fish often exhibit significant deviations or generational fluctuations from a one to one sex ratio, biased in either a female or male direction, indicates that more is involved than the sex genes on sex chromosomes. Unlike other animals, many fish species have undifferentiated sex chromosomes, except for the sex-determining gene. But genes involved in sex determination are not restricted to sex chromosomes, and, therefore, the symbolic notations XX-female and XY-male are not the only possibilities. The male- and female-determining genes on the X and Y chromosomes are regulated by these other genes, and the sex of an individual is determined by the interaction of the sex gene and the regulator gene. In addition, there is evidence that a third set of genes controls the regulator gene and that sex, therefore, is determined by a hierarchical system of genes. A mutant regular gene is responsible for the appearance of XX males.

At present, experiments are in progress to find a biological marker for regulator genes.

Dr. Kallman discovered a new species of *Ziphophorus* in the Rio Claro and in the high altitude tributaries of the Atlapexco and Rio Calabozo systems of eastern Mexico. Geological research is being conducted to obtain clues about the present distribution of the species.

## Pressure tactics

Dr. John A. Chamberlain, Jr.'s work with deep-sea organisms focused on the effects of small changes in pressure on two cephalopods — the chambered nautilus and the cuttlefish. The research was conducted with the Lab's prototype high-pressure aquarium, which was developed at the University of North Carolina with the backing of NYZS Trustee Nixon Griffis.

It was discovered that the nautilus, though unaffected by decreasing pressure, will rapidly swim upwards when pressure is increased, as it would in the ocean to avoid being crushed at intolerable depths. Work will continue to determine how pressure is sensed by the nautilus. Cuttlefish, on the other hand, show no reaction to pressure changes. This seems to indicate that these more shallow-water species, though related to nautilus, depend on other factors, such as light intensity and water temperature, to monitor depth, where-

as nautilus must depend on pressure sensitivity at depths where light is absent and temperature constant.

Using pressure-conserving traps in the manned submersible *Pisces IV*, Dr. Chamberlain retrieved vertebrates and invertebrates at a depth of 1,000 meters off Bermuda and returned many live to the Aquarium. Dr. Chamberlain will continue, in the summer of 1989, to develop reliable methods for capturing live deep-water animals for long-term scientific research and public exhibition.

## Pathology and Toxicology

Four new parasites were described and named by the Pathology Department under Dr. Paul Cheung: *Cocomyxa hoffmani*, in the gill cartilage of a coral catfish; *Septemcapsula plotosi var. S. yasunagai*, from the brain tissue of a coral catfish; *Dermophthirius melanopteri*, from the muscle fibers of a smooth anglerfish. Coral catfish were also infected by a bacterial pathogen, *Edwardsiella tarda*, that is normally only found in freshwater catfish.

In his work on the Moses sole from the Red Sea, Dr. Naftali Primor isolated two toxic compounds from the sole's poisonous secretion, which causes paralysis in the jaws of sharks. It is hoped that the extracted toxin can be developed into an effective shark repellent for human use.



The chambered nautilus knows when it is out of its depth.

# City Zoos Project

## Central Park Zoo

By June it was still not totally apparent that the new Central Park Zoo would open as planned on August 8, 1988 (it did, however, with great fanfare). The Society had made all arrangements for the new animals and had already introduced some species where construction was complete, but there were still tradesmen on the job and much remained to be done. On June 16, 1988, a press conference at the zoo gave members of the media a chance to tour the new facilities. Though many of the exhibits still lacked some final touches, the zoo was widely praised. But this event was small compared to the opening scheduled for a month and a half later, when Mayor Koch would feed fish to the big male sea lion, Fin, and thousands of invited guests and visitors would be on hand.

Under Director Richard Lattis, the staff spent hour after hour in the final days planting the grounds and gardens, installing interpretive graphics, observing animals in their new habitats, attacking mounds of paperwork, and generally preparing the zoo for its grand re-opening. Each task, when compounded by

the activities of the construction trades, last minute checks of systems, and inevitable unexpected problems, became a major undertaking. Harried curators, keepers, horticulturists, tradespeople, graphic artists, and support staff were often and capably assisted by other NYZS staff from the Bronx Zoo and New York Aquarium. Employees worked late into the evening, with a dedication to see the project through. Even so, as new animals were introduced into the exhibits, people who had worked so hard the night before spent time enjoying them before going home.

Most plants for the Tropic Zone were installed during the fall of 1987, and the remainder were planted in the early spring of 1988, under the direction of Horticulturalist Nancy Tim, assisted by Robert Blair. Many thousands of plants that form the green walls in the building were painstakingly inserted through the chain link mesh into sphagnum moss bedding. The magnificent Central and Intelligence gardens were planted in the spring and were admired even before opening by those who walked along the pathway behind the Arsenal.

California sea lions were already acclimating to their Central Garden pool in June.





This underwater ballet is one of many polar bear views at the new zoo.

Chinstrap and gentoo penguins arrived in early June and readily took to their new Edge of the Icepack environment in the Polar Circle. The birds were so calm they allowed the keepers to walk among them the first day they arrived. Neither did the polar bears have trouble acclimating to their new multilevel home, and their eleven-foot deep pool was a cool refuge during the hot summer days. Each introduction by the Central Park Zoo animal department under Curator James Murtaugh went without a hitch, and the long-planned exhibits in most cases exceeded expectations. Accolades and enthusiastic support for the Society's new wildlife environments were abundant from the many participants in the pre-opening gala events held throughout June. There was no doubt that the zoo was destined to be one of the City's biggest hits.

#### **Flushing Meadows-Corona Park Zoo**

Members of the City Zoos Project staff continued to work on the Flushing Meadows-Corona Park Zoo plans as the Central Park Zoo neared completion. The New York City Department of Parks and Recreation planned to close the zoo in Queens the day the new

zoo in Manhattan was making its public debut. Construction would begin at that time and last for at least two years. NYZS staff will maintain a small office at the construction site, acting as exhibit supervisor, as they did for Central Park. In addition, they will undertake the creation and production of the zoo's graphics.

To prepare for renovation, the zoo's river otters and four of its California sea lions were transferred by NYZS personnel to the Central Park Zoo. The rest of the collection was moved to Prospect Park and other zoos by the Parks Department.

#### **Prospect Park Zoo**

Plans for the zoo in Brooklyn are expected to go to bid in the fall of 1988, and construction is slated to begin in the spring of 1989. It will take at least three years to renovate the zoo, with the Society acting as exhibit supervisor during construction. In addition, the Society will probably design and supervise installation of the graphics and associated participatory devices at the new zoo.

# EN PELIGRO



# Wildlife Conservation International

*Wildlife Conservation International aims to help preserve the earth's biological diversity and maintain its ecological processes by focusing on key species and ecosystems. Through on-site study, consultation, and training, often extending over many years, WCI addresses conflicts between humans and wildlife, explores locally sustainable solutions, and helps build national capacities for conservation and international support for its implementation.*

With this statement, WCI summarized its mission for the twenty-first century at a meeting on St. Catherine's Island, Georgia in late March 1988. It was the first gathering of WCI's entire scientific and administrative staff, which now includes fourteen full-time conservation biologists, and its purpose was to redefine the Society's conservation philosophy and operating procedures at a time when the destruction of nature is growing exponentially. The emphasis was on program direction and coherence as well as expansion.

New program guidelines and priorities were established with the goal of sustaining the well-being of human societies by caring for nature, the basic human environment. In this context, conservation is understood as the improvement of human ecology and human prospects. Solutions to wildlife problems must involve accommodation between the needs of people and wildlife and dedication by those most directly affected to preserve and improve the accommodation.

WCI's first commitment is to the field, to the long-term task of gathering data and providing consultation where the problems are solvable, particularly in the Third World. This also means working closely with local communities, government agencies, and regional groups to inspire concern and interest, to train and educate decision-makers and conservation professionals, to help build environmental institutions, and to plan and monitor conservation strategies and nature reserves.

The meeting concluded that every WCI project should not only expand knowledge but also generate a conservation product, such as a wildlife management plan, an education program, or assistance in creating a reserve. In this, WCI field scientists have the unique advantage of being able to draw on the talents and expertise of NYZS animal curators, veterinarians, nutritionists, educators, exhibition designers, and other zoo and wildlife professionals.

Every project should also strengthen indigenous conservation programs and skills, some directly by funding conservation biologists as principal investigators in their own countries, others by training scientists, park administrators, wardens, and guides. The

ultimate goal, of course, is to help foster powerful conservation communities that are sensitive to particular national and regional needs.

Determined by conservation needs and staff interests, seven integrated regional WCI programs were established: East African grasslands, Central African forests, northern South America, southern South America, Mesoamerica and the Caribbean Basin, Southeast Asia, and Central Asia.

More than half of WCI's projects focus on tropical forests, where biological diversity is unequalled and ecological problems are most severe. But ecosystems of less diversity are not forgotten, and the framework exists for a wide variety of initiatives, such as Deborah Glockner-Ferrari's long-term monitoring of humpback whales near Hawaii and the black-footed ferret recovery program in the western United States. The new geographic system will enable WCI to develop its own regionally significant projects rather than support less relevant independent proposals. Even so, the overall program will be driven not by a central bureaucracy but by imperatives emerging from field experience.

## East African grasslands

WCI has had more projects on the grasslands of East and Central Africa during the past three decades than anywhere else, and it continues in its efforts to help save the marvelous diversity of large mammals from poaching, land-use conflict, habitat fragmentation, and other problems. Three of WCI's staff zoologists are based in the region, each focused on a different country.

WCI Director David Western is a Kenyan who coordinates the grasslands program from Nairobi. In addition to his long-term work in Amboseli Park, he is collaborating with Helen Gichohi in devising management plans for Nairobi Park, where migratory routes of zebra and antelope are being disrupted, and with Frederick Waweru in studying the impact of fencing on black rhinos reintroduced in Nakuru National Park and the rhinos' effect on the park.

The latter project is part of an emergency effort, directed by Western as chairman of the African Elephant and Rhino Specialist Group, to save the black rhino from extinction. Through public appeal, WCI's Rhino Rescue Fund has provided funds to set up new rhino sanctuaries in Tanzania as well as Kenya's Aberdare, Meru, and Tsavo national parks; to protect rhinos in Cameroon and Chad; to reinforce anti-poaching patrols in Zimbabwe; and to help crush the rhino horn smuggling network.

Senior Staff Zoologist Patricia Moehlman, based in Tanzania, has established an ecological monitoring program in the Ngorongoro Conservation Area and trained local personnel to run it. She and Western recently instructed a group of Tanzanian, Ugandan, and Ethiopian researchers in aerial censusing and she is hoping to start another monitoring program in Ruaha National Park.

In Ethiopia, Research Zoologist Jesse C. Hillman has become principal advisor on wildlife to the government, an indication of how the effectiveness of research can reach far beyond scientific goals. With the implementation of his management plan for the Bale Mountain reserve underway, Hillman has begun a new effort on the plateau around Debre Birhan, northeast of Addis Ababa.

#### Central African forests

The Kibale Forest Research Station in Uganda, where Research Zoologist Thomas Struhsaker studied primates for nearly two decades, is being enlarged with a European Economic Community (EEC) grant that includes living accommodations for Ugandan university students and other researchers. WCI's commitment to the Kibale Forest project, now supervised by Gary Tabor, has shown the value and need for long-term studies. Assistant Director William Weber, is now coordinating a regional rain-forest initiative that stretches across equatorial Africa.

WCI summit meeting on St. Catherines Island in Georgia, (left to right): Thomas Struhsaker, Mary Pearl, William Weber, Alan Rabinowitz, Patricia Moehlman, Archie Carr III, Geoffrey Mellor, Matthew Hatchwell, Terese Hart, Charles Munn, David Western, Stuart Strahl, Chris Hillman, Frank Y. Larkin, William Conway, and George Schaller.

In the Ituri Forest of Zaire, Research Zoologists John and Terese Hart are conducting the first major research on okapi, an elusive forest relative of the giraffe. Nine okapi have now been radio-collared and are being monitored for territorial behavior and needs. In a recent visit, Chief Veterinarian Emil Dolensek helped refine immobilization techniques and conducted vitamin, cholesterol, and parasite tests. The Harts are working to gain support for a national park in the Ituri, based on their studies.

Other projects include Richard Barnes' survey of forest elephants, now expanded beyond Gabon to the entire equatorial forest region, with training for local people in censusing techniques; Richard Carroll's and Michael Fay's behavioral research on lowland gorillas in Central African Republic, where the establishment of the Dzanga-Sangha Dense Forest Reserve has been proposed; and the second phase of Amy Vedder's work in developing multiple-use management for training, tourism, and education in Nyungwe Forest, cooperatively supported by WCI, the United States Agency for International Development, and the Rwandan government.

#### Northern South America

As a WCI Research Zoologist teaching at Simon Bolivar University in Caracas, Stuart Strahl has become a central figure in Venezuelan conservation. His coordination of WCI's program in the area has



encompassed some 34 projects over the past three years and now extends into Colombia and Ecuador. Among his chief research concerns is the avian family Cracidae (curassows, guans, and chachalacas), for which he organized a highly successful international conference held in Caracas in February-March 1988. WCI studies of these increasingly endangered birds are now underway in Mexico, Honduras, and Colombia, as well as Venezuela.

While continuing his seminal studies of long-lived macaws in Peru's Manu National Park, Research Zoologist Charles Munn has also been exploring with Peruvian authorities means for protecting the Tambopata-Candamo area adjacent to Manu. This lower montane tropical rain forest is reported to be the world's richest in biodiversity.

#### Southern South America

WCI's focus in Argentina and Chile, coordinated by Senior Conservationist William Conway, has so far been on colonial birds and mammals, on saving large aggregations of animals that are vulnerable to so many threats. During his trip through the Pampas and Patagonia in December 1987, Conway identified multiple sites for study and protection, particularly along the coast, and spent much time developing plans with local conservationists. At the same time he completed arrangements for increasing the only pampas wetland reserve, Campos del Tuyú, by more than 30 percent, through the generosity of NYZS President Howard Phipps, Jr.

At Punta Tombo, Dee Boersma's research on Magellanic penguins is accompanied by vigorous programs of training for students, park stewardship, and volunteer work by local citizens and NYZS members. At Peninsula Valdés, Guillermo Harris completed text and illustrations for his *Guide to the Birds and Mammals of the Valdés Peninsula* and acted as WCI's representative in efforts to get a newly popular seabird and sea lion colony set aside as a reserve.

Claudio Campagna has been a focus of conservation and student activity at Punta Norte, where he has done important work on the southern sea lion. Most recently, he prompted a government investigation of the death of scores of Magellanic penguins due to an oil spill.

In Paraguay, Andrew Taber is studying a single species, the tagua or Chacoan peccary, which was discovered only in 1972 and already seems to be near extinction. Shocked at the apparent decline of the tagua, due to commercial incursions and subsequent hunting, Taber is working to promote awareness as well as a breeding program and reserves to protect this species and its thorny, forbidding habitat.



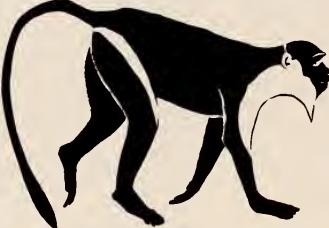
The orangutan is a key animal in West Kalimantan's tropical rain forest, where WCI Research Fellow Mark Leighton is conducting his ecological research.

#### Mesoamerica and the Caribbean Basin

The forests of Central America, including those of southern Mexico, the estuaries in the region, and the barrier reef of Belize — the second largest in the world — have all received WCI's attention in the past. Now projects in this region will be overseen as part of a total program by Archie Carr III, based in Gainesville, Florida, as Regional Coordinator.

A major effort is being expended on behalf of a hoped-for "Peace Park" covering nearly three million acres of tropical forest across the borders of Mexico, Guatemala, and Belize. WCI has commissioned four projects to provide essential ecological information, three of them conducted by local scientists: Ignacio March studying white-lipped peccaries in Mexico, María José González-Fuster on ocellated turkeys in Guatemala, and Milton Cabrera evaluating the Petén region of Guatemala. American zoologist Bruce Miller

**MCHNKI DE PLENTI**



**TIWAI ISLAND WILDLIFE SANCTUARY**

**HOW TO GET THERE:**

BC	KAMBABA	TIWAI ISLAND	For Reservations:
30 miles	10 miles	TIWAI ISLAND	Tiwai Island Wildlife Sanctuary P.O. Box 153 BC
MANAJUMA - 17 miles		TIWAI ISLAND	
BC		TIWAI ISLAND	

**SPONSORED BY: WILDLIFE CONSERVATION INTERNATIONAL / NEW YORK ZOOLOGICAL SOCIETY**

WCI grantee John Oates was instrumental in establishing the nature sanctuary on Sierra Leone's Tiwai Island.

has been assessing the forest around the Caracol Archaeological Site in Belize.

On Belize's barrier reef, a study by Jacque Carter and Janet Gibson continues to bear fruit. Their previous work on the Nassau grouper inspired the establishment of Hol Chan Marine Reserve in 1987. The government now seems ready to protect a much larger area south of Hol Chan, at Glover's Reef, where tourism and controlled fishing will be permitted in certain zones.

#### Southeast Asia

WCI has increased support to projects on the great islands of Southeast Asia, particularly Borneo and New Guinea, but maintains a presence on the mainland as well. In both areas, tropical rain forest is disappearing at a faster pace than anywhere else, and WCI is concerned with understanding and preserving as much unexploited forest land as possible.

In Thailand's Huai Kha Kaeng Sanctuary, Research Zoologist Alan Rabinowitz is tracking the habits and requirements of small and large cats in the forest, accumulating data that will be useful in creating

reserves throughout the vast region in which these cats occur. In Taiwan, as the result of Rabinowitz's earlier research and lobbying, the government established Tawu Mountain Nature Preserve, the island's largest wildlife sanctuary, on January 18, 1988. Rabinowitz will assist in preparing a detailed management plan for the area.

During his January visit to the mainland, WCI Director for Science George Schaller was invited to attend a crucial workshop in Vietnam on the kouprey, a large, nearly extinct bovid that the governments of Vietnam, Laos, and Kampuchea hope to protect in a captive herd. Schaller will return for two months in early 1989 to conduct a wildlife survey with Vietnamese scientists in the Bu Gia Map Reserve.

Borneo is the site of two major projects. Elizabeth Bennett has studied proboscis monkeys for four years in the mangrove forests of Sarawak (Malaysian Borneo), where lumbering threatens wildlife and the livelihood of shrimp fishermen. She has proposed to protect the largest intact area of mangrove swamp as Salak Mangroves National Park and is working closely with government officials and local communities to that end.

Mark Leighton's investigation in the Gunung Palung Nature Reserve of West Kalimantan (Indonesian Borneo) centers on the role of fruit- and seed-eating mammals and birds in tropical forest ecology. He has recently been concerned with the impact of the government's human resettlement program on the forest

In Papua New Guinea, WCI's interest in birds of paradise under NYZS Chairman of Ornithology Donald Brunin has spurred the conservation movement there. Research on these extraordinary species is now being conducted by Clifford and Dawn Frith, while WCI trains local scientists, helps develop facilities for nature tourists, and funds the establishment of the country's new Research and Conservation Foundation.

#### Central Asia

The picture of wildlife decline on the Tibetan Plateau remains grim, with hunting continuing unabated. George Schaller's survey there since 1985 suggests the need for creating a reserve in the remote central and northwestern region of the plateau, but no action has been taken by the Chinese government. Meanwhile, Schaller is extending his survey into Outer Mongolia after a year of writing and overseeing other WCI projects in Asia and South America.

Additional initiatives in China have been planned, including studies of black-necked cranes and highly endangered Guizhou golden monkeys, which are estimated to number less than 500 animals in the wild. Another precarious primate, the lion-tailed

macaque, is the subject of a conservation effort in southern India.

#### **Support for scientists of developing nations**

As an important aspect of its regional programs, WCI will place even greater emphasis than at present on training, employing, and deploying Third World conservation professionals. WCI research and conservation grants will be awarded mainly to indigenous scientists; in fact, more than half of current projects are already directed by principal investigators working in their own countries.

Support for this effort toward conservation self-sufficiency is growing. An active field science program for students in Thailand, fourteen of them last year, is being administered by Warren Brockelman. With a grant from the Jessie Smith Noyes Foundation in 1987, WCI established a fellowship program that enables Third World biologists to return as practicing conservationists to their own countries after receiving training abroad. Five biologists, one each from Tanzania, Uganda, Argentina, Peru, and Thailand, received fellowships this year. Additional funds were provided by Noyes this year for student scholarships and reference materials in WCI's Northern South America program, coordinated by Stuart Strahl.

The J.N. Pew, Jr. Charitable Trust doubled its support for training components of WCI projects around the world with a two-year grant. These funds are also being used for principal investigators working in their own countries.

#### **New York headquarters**

The shift in WCI's overall program has also brought a change in its staff structure. With Archie Carr, after eight years as Assistant Director, transferring to Florida as Regional Coordinator for Mesoamerica and the Caribbean Basin, the administrative staff has been expanded. While David Western serves as Director and George Schaller as Director of Science, both from the field, the New York staff now includes two assistant directors. Mary Pearl, known for her work in primatology, now has responsibility for grants program administration. William Weber joins the office after several years of conservation work in Rwanda and is focusing on the implementation of conservation planning and the development of joint programs with international agencies. His efforts have already led to two grants from the United States Agency for International Development, one for the Nyungwe Reserve in Rwanda and the other for the Korup National Park in Cameroon.

Andrew Taber is working in Paraguay to help save the giant peccary.



## WCI Field Projects Around the World (1987–88)

### North America

1	Black-footed ferret recovery	Colorado, Montana, Nebraska, Oklahoma, South Dakota, Utah, Wyoming
2	Humpback whale	Deborah Glockner-Ferrari Hawaii
3	Horned guan	Fernando Gonzalez-Garcia Mexico
4	Totoaba reproductive biology	Juan Carlos Barrera-Guevara Mexico

### Central America and the Caribbean

5	Bahamas parrot	Rosemarie Gnam Bahamas
6	Comprehensive planning	Archie Carr III Belize
7	Belize Barrier Reef	Jacque Carter and Janet Gibson Belize
8	Marsh birds and tropical forest conservation	Bruce Miller Belize
9	Solenodon status	Jose Ottenwalder Dominican Republic

### South America

10	Magellanic penguins	Dee Boersma and William Conway Argentina	24	Ecology of Amazon parrots and Peruvian conservation	Charles Munn Peru
11	Sea lion and Patagonia coastal conservation	Claudio Campagna Argentina	25	Guans, curassows, oilbirds and conservation in Venezuela	Stuart Strahl Venezuela
12	Support for conservation, Province of Chubut	William Conway and Graham Harris Argentina	26	Orinoco crocodile captive breeding	John Thorbjarnarson and Tomas Blohm Venezuela
13	Oiled penguins	ECOBIOS Argentina	27	Spectacled bear survey	Isaac Goldstein and Edgard Yerena Venezuela
14	Cetacean stranding network	Alfredo Lichter and Hugo Castillo Argentina	28	Crocodilian coastal habitat	Andres Seijas Venezuela
15	Suri survey	Juan Garcia Fernandez Argentina	29	Oilbird genetics	Robert Roca and Patricia Gutierrez Venezuela
16	Right whale/tourist interactions	David Garcíarena Argentina	<b>Africa</b>		
17	Flamingo conservation and workshop	CONAF Chile	30	Lowland gorilla status and reserve	Richard Carroll and Michael Fay Central African Republic
18	Primates of Apaporis River Basin	Thomas Defler Colombia	31	Ecology of mountain nyala and Bale Mts. National Park management	Chris Hillman Ethiopia
19	Pinzon Island giant tortoise	Linda Cayot and Luis Calvopina Ecuador	32	Simien jackal ecology	Claudio Sillero and Maria Gottelli Ethiopia
20	Waved albatross	W.L.N. Tickell Ecuador	33	Forest elephant	Richard Barnes Gabon
21	Bird inventory	Deirdre Platt Ecuador			
22	Chacoan peccary	Andrew Taber Paraguay			
23	South American fur seal	Patricia Majluf Peru			





34	Habitat disturbance	Sally Lahm <i>Gabon</i>	46	Jackal ecology and Tanzanian conservation	Patricia Mochlman <i>Tanzania</i>	58	Proboscis monkey and mangrove conservation	Elizabeth Bennett <i>Malaysia</i>
35	West African manatee	James Powell <i>Ivory Coast</i>	47	Ngorongoro Crater monitoring and training	Karim Hirji and Patricia Mochlman <i>Tanzania</i>	59	Birds of paradise	Clifford and Dawn Frith <i>Papua New Guinea</i>
36	Zoological monitoring in Amboseli NP	David Western <i>Kenya</i>	48	Chimpanzee ecology and behavior	Isabrye Basuta <i>Uganda</i>	60	Seed dispersal ecology	Andrew Mack <i>Papua New Guinea</i>
37	Capital improvements in Amboseli and Nairobi Parks	David Western Government of Kenya <i>Kenya</i>	49	Kibale Forest Project	Thomas Struhsaker <i>Uganda</i>	61	Wildlife surveys, Tibet	George Schaller <i>People's Republic of China</i>
38	Black rhino translocation	Fred W. Waueru <i>Kenya</i>	50	Okapi ecology and behavior	Terese and John Hart <i>Zaire</i>	62	Training program	Rudy Rudran <i>People's Republic of China</i>
39	Black rhino genetic study	Don Melnick and David Western <i>Kenya/USA</i>	51	Support for African Elephant & Rhino group	David Cumming <i>Zimbabwe</i>	63	Philippine wetlands	Perla Magsayal <i>Philippines</i>
40	Tana River Primate conservation	M. Kinnaird, K. Medley and P. Murphy <i>Kenya</i>	52	World Tortoise Survey	Ian Swingland	64	Palawan peacock	Marcelo Caleda <i>Philippines</i>
41	Advanced training	Helen Gichohi <i>Kenya</i>	53	Guam rail reintroduction	Stewart Pimm <i>Guam</i>	65	Philippine tarsier	Mary Jean Arguillas <i>Philippines</i>
42	Ring-tailed lemur	Hantanirina Rasmamianana <i>Malagasy Republic</i>	54	Lion-tailed macaque	Ajith Kumar <i>India</i>	66	Survey and reconnaissance	Clifford Rice <i>Southeast Asia</i>
43	Afromontane forest conservation	Amy Vedder <i>Rwanda</i>	55	Effects of forest fire and drought	Judith Campbell <i>Indonesia</i>	67	Environmental education	James Connor <i>Southeast Asia</i>
44	Conservation education	John Oates and Anne Todd <i>Sierra Leone</i>	56	Tropical ecology	Mark Leighton <i>Indonesia</i>	68	Conservation coordination	Warren Brockelman <i>Thailand</i>
45	Ungulate survey/ Serengeti-Mara	A.R.E. Sinclair <i>Tanzania</i>	57	Primate survey, Pagai Islands	Richard Tenaza <i>Indonesia</i>	69	Small carnivores	Alan Rabinowitz <i>Thailand</i>
						70	Gurney's pitta	Adam Gretton <i>Thailand</i>



YOU'RE  
THIS  
CLOSE  
TO THE  
BIG  
BRONX  
ZOO



The year began with giant pandas at the Bronx Zoo and ended with celebrations to honor the impending debut of the new Central Park Zoo. In between, the Development division raised a total of \$10,803,002. Membership increased its enrollment to a record high, and assistance to WCI's efforts overseas was highlighted by money raised and publicity generated for the Rhino Rescue Fund. Meanwhile, plans were well underway for the formulation of a major capital campaign.

### Capital funds

On June 28, 1988, nearly 300 guests gathered at the soon-to-open Central Park Zoo to honor the donors and supporters whose combined efforts had made the new zoo possible. The gala dinner was underwritten by a generous grant from The Home Group, Inc. Fittingly, the final major gift for the reconstructed zoo was a disbursement of \$870,000 from funds associated with the late Lila Acheson Wallace, whose sustained interest and generosity were crucial to the project. Private funds raised for the zoo by year's end totaled \$15,743,558.

Construction continued to progress on Discovery Cove at the Aquarium, another joint NYZS-City funded project. The Women's Committee raised significant support for the project from their Central Park Zoo Celebration on June 21, 1988. Another major gift came from The Achelis Foundation, bringing the total private funds raised to \$2,303,854, with a balance of \$1,471,146 still needed. Several gifts were offered in tribute to the late Dr. George Ruggieri, in whose memory the new exhibition-education complex will be named.

Important donations for Bronx Zoo projects were received from The Bodman Foundation for the Keith W. Johnson Zoo Center (the restored Elephant House), and from General Foods for the Cogeneration and District Heating System. Plans to restore and renovate Astor Court as part of a new capital effort were given a tremendous boost by a grant of \$500,000 from The Nichols Foundation, honoring the wishes of the late Charles W. Nichols, Jr., long-time NYZS Trustee, officer, and champion of conservation causes.

### Budgetary funds

Contributions from individuals, private foundations, and corporations toward the daily operating expenses of the Bronx Zoo, New York Aquarium, and other NYZS divisions totaled \$2,785,962. Bequests to the Society totaled \$1,224,588, including major apportionments from the estates of Margaret Carter and Dora Dennis.

Individuals gave \$889,952. More than \$350,000 came from Annual Patrons above and beyond their \$1,000 membership dues.

In its second year under Chairman Marshall Manley, the Business Committee raised \$799,768 from 161 corporations. Prominent in this campaign were Con Edison, Citibank, Chase Manhattan Bank, Hoffmann-LaRoche, Liz Claiborne, Banner Gelatin Products, and American Express. Part of the corporate total was \$250,000 raised by the highly successful Central Park Zoo Corporate Preview on June 23, 1988, co-chaired by Richard A. Voell, CEO of The Rockefeller Group, and Rand V. Araskog, Chairman and Chief Executive of the ITT Corporation. The event was underwritten in part by Alison and Leonard N. Stern.

Programs for corporate participation were expanded during the year. The Corporate Membership Plan was instituted to provide benefits, increasing with size of contribution, for the employees of contributing companies. And two special Corporate Employee Weekends were added, giving employees of donor companies free admission at the Bronx Zoo, New York Aquarium, and Central Park Zoo on assigned dates.

Private foundations contributed \$1,096,242 in budgetary funds. Noteworthy were gifts from the Edward John Noble Foundation for endangered species breeding and research programs at the Wildlife Survival Center on St. Catherines Island, Georgia, the Samuel and May Rudin Foundation for education at the Central Park Zoo, the Norcross Wildlife Foundation for horticultural projects at the Bronx Zoo, the F.M. Kirby Foundation for animal health, and the Aaron Diamond and Louis Calder foundations for Bronx Zoo education.

Funding for the Aquarium and the Osborn Laboratories reached \$302,069, with exceptional gifts from Trustee Dr. Henry Clay Frick II and from the Greenwall Foundation.

The department's Guest Services program, in support of fund-raising activities, managed 59 meetings, receptions, luncheons, dinners, and tours at the Bronx Zoo, New York Aquarium, and Central Park Zoo, which was the focus of many events throughout the month of June.

### Conservation funds

Contributions of \$1,972,753 were received for the programs of Wildlife Conservation International, an increase of 55 percent over the preceding year. This growth reflects the rising importance of WCI's work within the Society and our shared responsibility to preserve endangered fragments of nature.

Individuals gave \$748,492, foundations \$1,048,225, and corporations \$131,036.

Funding for programs to train conservation biologists in developing nations was renewed by the Pew Charitable Trusts of Philadelphia. The Jessie Smith Noyes Foundation helped WCI initiate a series of conservation field seminars and workshops in Venezuela, Colombia, and Ecuador, coordinated by Research Zoologist Dr. Stuart Strahl in Caracas.

The Art Ortenberg and Liz Claiborne Foundation assisted Dr. David Western in the development of a major new campaign on behalf of Africa's dwindling elephant populations with a grant for analysis of the ivory trade. The foundation also supported the rapid implementation of conservation field projects in Ethiopia, Thailand, Venezuela, Kenya, and Tanzania.

In tribute to the late Charles W. Nichols, Jr.'s abiding commitment to African wildlife, The Nichols Foundation generously provided \$500,000 to endow funding for conservation projects in Africa, where WCI has budgeted almost \$1 million in program expenses for the coming year.

Support for conservation in Argentina and tropical forest work in Peru and Gabon was provided by a generous gift from Mrs. Ann Pattee. A grant from the Bradley Goldberg Charitable Trust made possible Dr. Alan Rabinowitz's field work in Thailand's Huai Kha Khaeng Wildlife Sanctuary. Significant corporate gifts were received from the Ogilvy Foundation, Exxon Corporation, the New York Times Company Foundation, and Allied-Signal Inc.

Under the leadership of Trustee and Conservation Committee Chairman John Pierrepont, the Friends of WCI circle grew to 90. This group of annual con-

tributors of \$2,500 or more to WCI provides the core of annual operating support for conservation activities. Earned income from the William Beebe Fellows fund was awarded to WCI's Stuart Strahl for conservation in Venezuela. The Beebe Fellows, donors of \$10,000 for this WCI endowment, now number 37.

WCI substantially increased its nationwide constituency through its direct mail program. Particularly effective was WCI's Rhino Rescue Fund, which raised more than \$144,628 to finance a Five-point Action Plan coordinated by David Western in Nairobi. Added to the WCI roster were 8,547 new donors, many of whom watched the National Geographic special *The Rhino War* and called a toll-free telephone number for contributions to WCI. A fund-raising campaign on behalf of WCI's tropical forest projects also helped raise dollars and awareness for the understanding and preservation of this critical ecosystem. WCI supporters now number 35,000 in all 50 states.

#### Membership

On June 30, 1988, membership rolls stood at a record high of 33,610, an increase of about 2,800 members over last year. Membership dues and fees provided \$1,822,136 for the Society. In addition, members and donors contributed more than \$193,000 for general operating expenses through direct mail, \$62,000 in general contributions, and \$60,000 in corporate matching gifts.

Membership dues in the family and sustaining category were raised to \$50 and \$75, respectively, on April 1, 1988. Members were given an opportunity to extend their membership for one year at the old

Mayor Edward Koch officially opens the Central Park Zoo (on August 8), with a fish toss to Fin, the California sea lion.



rates, and more than 15,000 chose to do so.

Under the leadership of Trustee John Elliott, Jr., and John Chancellor, the Annual Patrons (\$1,000 members) now number 356. This group forms a basic core of support for NYZS.

Society members are a loyal and active group. Near home, they have attended garden parties, members evenings, and Central Park previews; helped to clean up the Bronx Zoo and New York Aquarium; and joined the travel program to watch whales off Cape Cod, observe birds in Jamaica Bay, and sail on the sloop *Clearwater*. Farther afield, under the leadership of NYZS staff and WCI scientists, they have banded penguins in Patagonia and gone on safari in East Africa.

The Society's 92nd Annual Meeting on February 17 at Lincoln Center's Avery Fisher Hall celebrated the 90th anniversary of the NYZS commitment to international conservation. More than 5,000 members and guests heard a recap of the previous year's activities, viewed documentary films on the rhino war in East Africa and the history of WCI, and were charmed by the Bronx Zoo's three baby gorillas, Triska, Lucy, and Koga.

Some 280 guests gathered at the President's Dinner following the Annual Meeting. Held in honor of NYZS Vice President of the Board of Trustees John Pierrepont, the evening netted more than \$143,000 for the renovation of the Wildfowl Pond at the Bronx Zoo, which will be named in honor of Mr. Pierrepont.

#### **Public Relations, Advertising, and Marketing**

During the first four months of the fiscal year, giant pandas remained the highlight for hundreds of media stories as well as citywide advertising. The pandas' visit enabled the higher attendance trend of recent years at the Zoo to continue. For this event and many other stories involving the Zoo, conservation, and research, curatorial staff members continued to be called upon as spokespersons by news broadcasts and television shows. They appeared prominently in the National Geographic Society's *Explorer* television series, Public Broadcasting's *Innovations* series, *Audubon Magazine*, and other print and electronic outlets.

At the Aquarium, Supervising Animal Trainer Alyson Seacat was featured in stories that appeared in *New York Newsday*, *National Geographic's World Magazine*, *People Magazine*, *Scene Magazine*, and in radio interviews across this country and Canada. The distribution of public information calendar cards was among the many strategies used to extend the Aquarium's attendance season into the fall months.

Marketing and public information were expanded to reach the media, donors, the scientific community, and the public on behalf of Wildlife Conservation



School kids, with mouse ears for the occasion, celebrate the opening of MouseHouse on April 29.

International. Activities ranged from publicizing WCI at U.S. zoos to speaking engagements for WCI scientists reporting from the field. Covered in film or print were Dr. Charles Munn's work with parrots in Peru, an international conference on endangered cracid species organized by Dr. Stuart Strahl in Venezuela, and legislative and conservation work for Africa's elephants.

WCI's collaboration on National Geographic's film *The Rhino War* helped focus attention on conservation in East Africa. Supported by NYZS-coordinated advertising, press tours, and toll-free, dial-in contributions, the Rhino Rescue Fund raised money and consciousness to save the rapidly disappearing black rhino. During the coming year, an expanded public service campaign, featuring celebrity voices, will be developed to bring WCI and conservation issues before the public.

Culminating the fiscal year were events, coverage, and advertising centered on the new Central Park Zoo. Media interest in the months before opening was enormous, as the department prepared press materials, brochures, and maps for media and public use. Several magazines, including *Avenue*, *New York*, and *Seven Days*, prepared major stories, and all the major local network television news programs made arrangements for live broadcasts from the new Zoo on the August 8 opening date.

In connection with long-range planning for the Society's future, the foundation for an expanded marketing program was established. This program will include marketing studies of the Society's various audiences and the development of new earned income resources through the licensing and merchandising of NYZS products and services.

# Publications Department

## Panda power

The first issue of the year — July/August — coincided with the giant pandas' visit to the Bronx Zoo. *Animal Kingdom* took advantage of this opportunity to give the public a closeup look at the lifestyle of the world's favorite animal and to explain about the goals, trials, and accomplishments of one of WCI's major conservation projects, Dr. George Schaller's work with Chinese scientists on pandas in the wild. With the front cover, a free pull-out poster, and three articles featuring the giant panda, the July/August 1987 issue broke all *Animal Kingdom* popularity records: 6,000 copies were sold in the Zoo, and national newsstand sales exceeded 65 percent of what was distributed — high by publishing industry standards.

The September/October issue incorporated a major redesign — including a new logo, department heads, typefaces, and rule treatment — to create a more modern, readable, and compelling look. Newsstand sales and renewal rates have improved through the year, and better design has helped.

## Courting our constituents

During the fiscal year, more than 35 American zoos bought *Animal Kingdom* as a benefit for their members. In appreciation for their continued support and to further promote zoos, we offered them free ad space on the magazine's back cover, beginning with the January/February 1988 issue. Response was so enthusiastic that the covers were almost immediately booked through 1989. Zoos eager to get ads in sooner opted instead for half-page or smaller ads inside the magazine, space allowing.

The January/February issue also brought the return of the "Vanishing Species" department in response to readers' concern about endangered wildlife [indicated repeatedly in studies conducted by Mark Clements Research, Inc.]. A special emblem now draws attention to feature articles about endangered species.

Knowing *Animal Kingdom*'s readers and their particular interests helps the staff fine-tune editorial content and target appropriate advertising. The 1988 demographic survey [by Clements] of zoo members and independent subscribers around the country has shown readers to be 46 percent male and 54 percent female, with 87 percent college-educated and 76 percent holding professional/managerial jobs. They travel often, read many books, use credit cards frequently, order merchandise by mail, and own extensive audio-

video equipment. Their favorite recreational activities include birdwatching, hiking, gardening, and photography. Median income is \$59,000; average household, \$84,000.

## Scotland's threatened Serengeti

This year's May/June issue was devoted primarily to "The Battle to Save Britain's Last Wilderness." Blending in-depth reporting with his own wonder at observing scores of nesting arctic bird species, Editor-in-Chief Eugene J. Walter, Jr. transported readers to the midst of a conservation controversy in the Scottish Highlands. In the interests of birds, people, and posterity, conservationists there are trying to wrest Scotland's blanket bogs [one of the world's precious ecological rarities] from the plows and planting rigs of commercial foresters.

Britain's pro-conservation organizations and politicians gratefully praised the report and the support it lends their efforts. Readers too appreciated the detailed and fair examination of all sides of the issue, indicating that they would like to see this kind of article in *Animal Kingdom* more often.

## Photographic Services

The giant pandas occupied the department until well after their departure at the end of October, as requests for their pictures continued to arrive from within and outside the Society. Images of Ling Ling and Yong Yong graced more posters and covers than those of any other zoo animals in recent memory. Other photo events during the year included the opening of MouseHouse, progress at the Central Park Zoo and the Aquarium's Discovery Cove, and the debut of a new polar bear baby.

The range of photos taken grows each year. Along with the usual and unusual animal photographs used in Society publications, pictures were produced of huge electric generators and miniature electronic equipment, people at parties and people at work, classes at the Zoo and educational materials. More than 2,500 color slides were supplied to the staff for fund-raising, design presentations, curatorial talks, and courses of all kinds.

To better match people with pictures, a computer-aided filing system is being devised. This large undertaking will encompass a photograph collector that started in 1899 and now numbers more than 200,000 images in black and white and in color.

# Administrative Services

To better express the concept of providing for the public at the Bronx Zoo, New York Aquarium, and Central Park Zoo, the name of the overall department encompassing Admissions, Parking, Transportation, and Group Sales, and Food and Souvenirs has been changed from Visitor Services to Guest Services. This change is accompanied by the new training program for temporary employees described below.

**Admissions, Parking, Transportation, and Group Sales**  
During the fiscal year Bronx Zoo attendance totaled 2,332,483 guests, including 1,269,941 from July through October, when the giant pandas were on exhibit. Just over half of these guests viewed the pandas. Attendance at the New York Aquarium reached 775,227, a record for the Coney Island site, which opened in 1957.

The Bronx Zoo's transportation system, including the Bengali Express monorail, the Safari Tour train, and the Skyfari, carried more than 1,300,000 passengers. JungleWorld, the Zoo's major new exhibition, drew 547,323 guests.

Group Sales had another strong year, benefiting from both the panda exhibit and an extensive direct-mail marketing campaign.

## Food and Souvenirs

New menus and food products have been successfully introduced at several facilities around the Zoo, and enhanced hiring, training, and development programs have been instituted for seasonal staff. Both improvements will be introduced at the Aquarium next year.

In souvenir operations, inventory management and distribution are targets for modernization and improvement. More attention will be given to educationally oriented products that are unique to the Society. A new cafeteria plaza and souvenir stand renovation remain part of the Society's long-range planning.

## Personnel

The Society's full-time staff increased from 459 to 520 during the year, primarily due to hiring at the Central Park Zoo. (Full staff listings appear on pages 75-78 of this Report). Positions include attendant, gardener, horticulturist, graphic designer, clerk, accountant, ticket agent, transportation manager, district main-

tainer, supervising maintainer, security guard, wild animal keeper, curator, instructor, archivist, editor, research zoologist, fish geneticist, and general director, among many others.

Seasonal workers employed to sell food, souvenirs, admission tickets, and memberships, to maintain the grounds and facilities, and to guide tours on the Bengali Express and Safari Tour Trains numbered more than 600 at the Bronx Zoo, New York Aquarium, and Central Park Zoo. They were introduced to the Society through an expanded Seasonal Training Program that was funded in part by the DeWitt Wallace Fund. These orientation sessions and departmental training programs, which will reach about 700 employees in 1988, stress the work of the Society in New York and around the world as well as employment skills needed in specific jobs. Trainees were as young as fifteen, and many held jobs for the first time.

Training programs of this kind were mentioned first in the Society's 1947 Annual Report. Forty years later, the Society continues in its commitment to staff development and training, with programs for full-time and seasonal employees.



Carol Burke of Group Sales won a Big Apple Award from The New York Convention and Visitors Bureau of New York.

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YUMI MAS LUKAUTIM  
GUT OL KUMUL  
BILONG PLES

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PROTECT OUR NATIONAL  
BIRDS OF PARADISE



## Report of the Treasurer

Revenue for general operating purposes exceeded expenditures by \$160,942 for the year ended June 30, 1988, due largely to the last four months of the giant pandas' visit. Capital improvement expenditures exceeded funds available by \$1,876,336; however, fortuitously, gains attributable to these projects offset this amount by \$1,719,186, with only \$157,150 withdrawn from Society reserves.

Total operating support and revenue increased more than \$7.5 million to \$46,482,027. Approximately \$5 million of this increase was used for general purposes, the balance for capital improvements. Contributions of \$9,505,844 accounted for 20 percent of total revenues. In addition, bequests of \$1,224,558 were received.

The City of New York, through the departments of Cultural Affairs and Parks and Recreation, appropriated \$9,405,026 for general operating purposes. The City also expended \$3,514,044 toward capital improvements at the Bronx Zoo and New York Aquarium. New York State, through the Natural Heritage Trust, provided \$2,065,669, and Federal agencies granted \$432,710. Aggregate funding from government sources increased 13 percent over fiscal 1987, providing critical support for basic operations.

Aquarium attendance, at 775,227, set a record for the Coney Island location, and Bronx Zoo attendance, at 2,332,483, reached its highest level since 1972. Admission fees brought in \$5,063,413. The Zoo's policy of free admission on Tuesdays, Wednesdays, and Thursdays, as prescribed in the Society's by-laws, enabled 58 percent of all visitors to enter without paying.

Visitor spending increased 13 percent at the Zoo and Aquarium as a result of increased attendance. Food, souvenir, and exhibit revenues recorded substantial gains as the Society began a program to enhance these services.

Endowment income provided \$4,792,642, 50 percent more than the previous year. By June 30, the Society's portfolio had recovered from the previous October's decline. The \$88,000,000 portfolio was invested equally between debt and equities for most of the year.

Bronx Zoo expenditures increased 10 percent, reflecting activities related to the exhibition of giant pandas during the first four months of the year. Capital improvement expenditures included \$1,014,695 for the Cogeneration and District Heating System, now under construction, which will modernize the Zoo's power plant and provide significant savings in energy costs for the City and Society.

At the Aquarium, expenditures increased 16 percent, reflecting costs associated with increased attendance. City-Society capital projects include Discovery Cove, which is expected to open in 1989, and Sea Cliffs, due to begin the bidding phase.

Conservation expenditures increased 35 percent, in line with planned program expansion. Wildlife Conservation International's message continued to reach a larger audience, with contributed support increasing by 55 percent.

Staffing of the Central Park Zoo was essentially complete as the exhibit work was ready for an August opening. Planning and design of the Prospect Park and Flushing Meadow zoos was complete, in preparation for bidding and groundbreaking at both sites.

The Society continues to expand its services and educational activities to a broader audience, in New York and around the world. Joint public and private support has enabled its programs to flourish for 93 years. Now it is more important than ever that this historic partnership be sustained.

David R. Schiff  
Treasurer



This naked mole rat, born at the Bronx Zoo on September 30, 1987, weighed in at 1½ ounces.



Peat Marwick Main & Co.  
345 Park Avenue  
New York, NY 10154

The Board of Trustees  
New York Zoological Society:

We have audited the accompanying balance sheet of New York Zoological Society as of June 30, 1988, and the related statements of support and revenue, expenditures, capital additions and changes in fund balances, and changes in financial position for the year then ended. These financial statements are the responsibility of the Society's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

As explained in note 1 to the financial statements, expenditures for land, buildings and equipment are not capitalized; therefore, depreciation of buildings and equipment is not recorded. Such practices are not in conformity with generally accepted accounting principles.

In our opinion, except for the effect on the financial statements of the matter discussed in the preceding paragraph, the financial statements referred to above present fairly, in all material respects, the financial position of New York Zoological Society at June 30, 1988, and the results of its operations and the changes in its financial position for the year then ended, in conformity with generally accepted accounting principles.

September 2, 1988

*Peat Marwick Main & Co.*

The first baby born in the Carter Giraffe Building's meerkat colony.



**New York Zoological Society**  
**Balance Sheet**  
**June 30, 1988**

	<b>Operating funds</b>	<b>Endowment funds</b>
<b>Assets</b>		
Cash, including short-term investments of \$5,166,461	\$ 6,748,520	—
Investments (note 2)	37,636,177	36,240,617
Accounts receivable	1,471,917	—
Grants and pledges receivable	3,497,567	—
Inventories, at lower of cost or market	1,249,439	—
Prepaid expenses and deferred charges	1,591,177	—
	<b>\$52,194,797</b>	<b>36,240,617</b>
<b>Liabilities and Fund Balances</b>		
Accounts payable and accrued expenses	5,946,066	—
Loan payable (note 3)	670,058	—
Deferred restricted support and revenue (note 6)	17,182,479	—
	<b>23,798,603</b>	<b>—</b>
Fund balances:		
Unrestricted:		
Designated for long-term investment	24,695,588	—
Undesignated	3,700,606	—
Endowment:		
Income unrestricted	—	14,006,343
Income restricted	—	9,879,886
Term endowment-income unrestricted (note 4)	—	12,354,388
	<b>28,396,194</b>	<b>36,240,617</b>
	<b>\$52,194,797</b>	<b>36,240,617</b>

*See accompanying notes to financial statements.*

**Statement of Support and Revenue, Expenditures, Capital Additions and Changes in Fund Balances**  
**Year ended June 30, 1988**

<b>Operating Funds</b>			
	<b>General</b>	<b>Capital</b>	<b>Total</b>
<b>Operating support and revenue:</b>			
Contribution and fund raising events, net	\$ 4,074,141	5,431,703	9,505,844
Government support:			
City of New York (note 9)	9,405,026	—	9,405,026
Other	2,498,379	—	2,498,379
Admission fees	5,063,413	—	5,063,413
Visitor services revenues (note 10)	10,195,648	1,596,406	11,792,054
Membership dues	1,822,136	—	1,822,136
Endowment and other investment income	3,751,602	1,041,040	4,792,642
Publications and related revenues	1,021,637	—	1,021,637
Education programs revenue	278,689	—	278,689
Collection sales (note 7)	—	111,231	111,231
Miscellaneous revenue	190,976	—	190,976
 Total operating support and revenue	 38,301,647	 8,180,380	 46,482,027
 <b>Expenditures:</b>			
Program services:			
Zoological Park	22,772,654	1,862,361	24,635,015
Aquarium	4,258,922	1,081,411	5,340,333
Survival Center	312,744	—	312,744
Wildlife Conservation International	2,574,834	—	2,574,834
Marine Sciences	529,767	—	529,767
Publications	1,044,396	—	1,044,396
Membership activities	863,899	—	863,899
City Zoos project (note 8)	1,033,994	7,112,944	8,146,938
 Total program services	 33,391,210	 10,056,716	 43,447,926
 Supporting services:			
Management and general	2,988,723	—	2,988,723
Fund raising	1,760,772	—	1,760,772
 Total supporting services	 4,749,495	 —	 4,749,495
 Total expenditures	 38,140,705	 10,056,716	 48,197,421
 Excess (deficiency) of operating support and revenue over expenditures/carried forward	 160,942	 (1,876,336)	 (1,715,394)

(cont.)

**Statement of Support and Revenue, Expenditures, Capital Additions and Changes in Fund Balances (cont'd.)**

	Operating Funds			Endowment funds
	General	Capital	Total	
Excess (deficiency) of operating support and revenue over expenditures, brought forward	\$ 160,942	(1,876,366)	(1,715,394)	—
Bequests	1,224,588	—	1,224,588	—
Realized net gains on investments	397,492	1,719,186	2,116,678	—
Excess (deficiency) of support and revenue over expenditures before capital additions	1,783,022	(157,150)	1,625,872	—
<b>Capital additions:</b>				
Contributions	—	—	—	1,619,852
Realized net gains on investments	—	—	—	1,462,465
<b>Total capital additions</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>3,082,317</b>
Excess (deficiency) of support and revenue over expenditures after capital additions	1,783,022	(157,150)	1,625,872	3,082,317
Fund balances at beginning of year	26,770,322	—	26,770,322	33,158,300
Transfer to fund capital expenses	(157,150)	157,150	—	—
<b>Fund balances at end of year</b>	<b>\$28,396,194</b>	<b>—</b>	<b>28,396,194</b>	<b>36,240,617</b>

*See accompanying notes to financial statements.*

**JungleWorld's first Malayan tapir baby.**



**Statement of Changes in Financial Position**  
**Year ended June 30, 1988**

	Operating funds	Endowment funds
<b>Resources provided:</b>		
Excess of support and revenue over expenditures before capital additions	\$ 1,625,872	
Capital additions:		
Contributions	—	1,619,872
Realized net gains on investments	<u>—</u>	<u>1,462,446</u>
Excess of support and revenue over expenditures after capital additions	1,625,872	3,082,
Items which do not provide resources — realized net gains on investments	(1,580,535)	(1,462,446)
Decrease in grants and pledges receivable	1,089,107	
Decrease in prepaid expenses and deferred charges	85,744	
Increase in accounts payable and accrued expenses	2,223,896	
Increase in loan payable	<u>335,735</u>	
<b>Total resources provided</b>	<u>3,779,819</u>	<u>1,619,872</u>
<b>Resources used:</b>		
Increase in accounts receivable	623,753	
Increase in inventories	81,547	
Decrease in deferred restricted support and revenue	3,461,120	
Purchase of investments, net of sales of \$19,976,745	<u>1,458,094</u>	<u>1,619,872</u>
<b>Total resources used</b>	<u>5,624,514</u>	<u>1,619,872</u>
<b>Decrease in cash</b>	<u><u>\$1,844,695</u></u>	

*See accompanying notes to financial statements.*

**Notes to Financial Statements**  
**June 30, 1988**

**(1) Summary of significant accounting policies**

The financial statements of the Society have been prepared on the accrual basis, except for depreciation as explained below. Other significant accounting policies follow:

**Fund accounting**

In order to ensure observance of limitations and restrictions placed on the use of available resources, the accounts are maintained in accordance with the principles of fund accounting. This is the procedure by which resources for various purposes are classified for accounting and reporting purposes into funds established according to their nature and purposes. Separate accounts are maintained for each fund; however, in the accompanying financial statements, funds that have similar characteristics have been combined into fund groups.

(continu)

## Notes to Financial Statements (continued)

The assets, liabilities and fund balances of the Society are reported in two self-balancing fund groups:

### **Operating funds**, which include unrestricted and restricted resources:

- Unrestricted funds represent the funds available for the support of Society operations.
- Funds restricted by the donor, grantor, or other outside party for particular operating purposes (including accessions and other capital additions) are deemed to be earned and reported as revenues of operating funds when the Society has incurred expenditures in compliance with the specific restrictions. Such amounts received but not yet earned are reported as deferred restricted support and revenue.

### **Endowment funds**, which include the following restricted resources:

- Funds that are subject to restrictions of gift instruments requiring in perpetuity that the principal be invested and only the income be used.
- Term endowment funds which must be held intact except that, at some future date or specified occurrence, some portion or all of the principal may be used (see note 4).

### **Plant assets and depreciation**

Plant acquisitions including buildings and improvements constructed on land owned by the City of New York are not capitalized and, accordingly, depreciation is not recorded in the Society's financial statements. Major expenditures for buildings and improvements are reflected as capital expenditures in the accompanying financial statements.

### **Collections**

Expenditures for collections are not capitalized.

### **Other matters**

All gains and losses arising from the sale, collection or other disposition of investments and other noncash assets are accounted for in the fund that owned the assets. Ordinary income from investments, receivables, and the like, is accounted for in the fund owning the assets, except for income derived from investments of endowment funds, which is accounted for, if unrestricted, as revenue of the unrestricted operating fund or, if restricted, as deferred amounts until the terms of the restriction have been met.

Enforceable pledges for operating purposes, less an allowance for uncollectible amounts, are recorded as receivables in the year made. Pledges for support of current operations are recorded as operating fund support. Pledges for support of future operations are recorded as deferred amounts in the operating fund. Pledges to the endowment funds are recognized upon payment of the pledge.

### **(2) Investments**

Investments are reflected at cost or fair market value at date of gift. The market value and carrying value of investments by fund at June 30, 1988 were as follows:

	Market value	Carrying value
Operating funds—expendable	\$43,716,842	37,636,177
Endowment funds—nonexpendable	<u>44,697,788</u>	<u>36,240,617</u>
	<b>\$88,414,630</b>	<b>73,876,794</b>

Details of investment assets at June 30, 1988, were as follows:

	Market value	Carrying value
Cash	\$ 536,138	536,138
Short-term investments	24,218,482	24,168,258
Corporate stocks	42,190,651	27,802,331
U.S. Government obligations	21,469,359	21,370,067
	<b>\$88,414,630</b>	<b>73,876,794</b>

(continued)

Notes to Financial Statements (continued)

Investment assets of endowment funds and operating funds are pooled on a market value basis with each individual fund subscribing to or disposing of units on the basis of the value per unit at market value, determined quarterly. Of the total units, each having a market value of \$237.91, 187,876 units were owned by the endowment funds and 183,754 units were owned by operating funds at June 30, 1988. The average earnings per unit, exclusive of net gains, approximated \$10.84 for the year.

The following tabulation summarizes changes in relationships between carrying values and market value of investment assets:

	Market value	Carrying value	Net gains
End of year	\$88,414,630	73,876,794	14,537,836
Beginning of year	89,186,270	67,755,848	21,430,422
Unrealized net losses for year			(6,892,586)
Realized net gains for year			3,043,000
Total net losses for year			<u>\$ (3,849,586)</u>

**(3) Loan payable**

Construction of a cogeneration facility at the Zoological Park began during 1987. The estimated cost of the facility is \$8,700,000. The City of New York through its capital improvement budget is funding approximately \$5,000,000. The balance, \$3,700,000, is being funded by the Society, of which approximately \$3,400,000 has been expended through June 30, 1988. An Urban Development Action Grant is providing up to \$1,000,000 in funding through a loan from the Financial Services Corporation. At fiscal year end, \$670,058 had been borrowed by the Society. The loan agreement requires monthly interest payments at an annual rate of 10%. The principal balance outstanding under the terms of the loan agreement is due upon maturity at December 30, 1994.

**(4) Term endowment (Animal Kingdom Fund)**

During 1976, the Society initiated a capital funds campaign. The campaign included a term endowment fund to serve various functions, as described below, subject to the following conditions:

- (a) The income of the term endowment fund shall be used for the general operating purpose of the Society.
- (b) The principal of the term endowment fund may be expended only upon the affirmative vote of two-thirds of the Trustees present at any duly held meeting of the Board of Trustees or its Executive Committee to finance programs or improvements to facilities (i.e., the Zoological Park, the New York Aquarium, or other facilities of the Society) to produce revenue or increase attendance, or (ii) to ensure the survival of the Society if funds from other sources fail to provide sufficient revenue to maintain the Society's programs; provided, however, that in the case of any contribution to the term endowment fund which was subject to a restriction not to expend the principal of such contribution without the prior consent of the donor thereof, in addition to the vote of the Trustees described above, such consent must be obtained in writing prior to the expenditure of such principal.

**(5) Pension Plan**

All eligible Society employees are members of the Cultural Institutions Retirement System's (CIRS) Pension Plan. Pension expense was approximately \$897,000, of which approximately \$362,000 was financed by an appropriation from the City of New York. The current year's provision includes amortization of prior service costs over a period of 30 years which commenced June 30, 1974. The Society's policy is to fund pension benefits accrued, and no unfunded vested benefits existed as of June 30, 1987, the date of the latest plan valuation. Because the CIRS Plan is a multi-employer plan, certain information as it relates to vested and nonvested benefits as well as plan assets is not readily available.

Notes to Financial Statement (continued)

(6) Deferred restricted support and revenue

The changes in deferred restricted support and revenue for the year ended June 30, 1988 are as follows

	Balance at beginning of year	Additions	Expenditures	Balance at end of year
Contributions and fund raising events	\$16,818,342	3,369,777	7,795,687	14,210,032
Fees and grants from governmental entities	243,922	353,977	331,611	249,185
Investment Income	(812,063)	1,794,474	2,096,301	(101,638)
Net gains on investments (losses)	1,062,270	(1,231,730)	176,874	1,526,126
Other	300,999	131,258	152,759	186,498
Total	\$20,643,509	8,902,112	12,363,232	17,182,479

(7) Collections

During the year ended June 30, 1988, animal collection admissions aggregated approximately \$240,000, while deaccessions aggregated approximately \$110,000.

(8) City Zoos Project

The Society and the City of New York have entered into agreements with respect to the Central Park Zoo, Prospect Park Zoo and the Bronx Museum Zoo. Early agreement provides for the City's renovation of these zoos in accordance with plans developed through consultation with the Society and approved by the City and, thereafter, for the Society's operation and management of each with funding from the City for an initial ten-year term, renewable by the Society for five additional 10-year terms. Except for the Central Park Zoo, the Society will expend no money for construction. The Society has committed approximately \$10,100,000 toward design and renovation costs at the Central Park Zoo, of which approximately \$16,000,000 had been expended through June 30, 1988.

(9) City of New York support

The Department of Cultural Affairs of the City of New York, in addition to personnel, general operating support, has reported to the Society that during fiscal 1988 it expended approximately \$3,514,000 at the Zoological Park and the Aquarium in capital improvements. Such amounts are not included in the accompanying financial statements.

(10) Visitor Services revenues

Details of visitor services revenues at June 30, 1988 were as follows:

Food sales	\$ 4,685,675
Souvenir sales	2,601,272
Parking	1,500,716
Transportation revenues	955,293
Exhibit admissions	833,135
Children's Zoo revenues	649,725
Gift shop sales	454,258
Animal rides	111,980
	<b>\$11,792,054</b>

# Contributions, Pledges, and Payments on Pledges of \$1,000 and Over (July 1, 1987 – June 30, 1988)

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CBS anchorwomen Bree Walker and Carol Martin interview City Zoos Project Director Richard Lattis at the Central Park Zoo opening.

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President Howard Phipps, Jr. presides over the official closing of the giant panda's visit to the Bronx Zoo on October 30, 1987.

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 Klaus D. Kallman, *Fish Geneticist*  
 Paul J. Cheung, *Pathologist*  
 Maya Natenson, *Research Assistant*  
 Catherine McClave, Calina Powerman, *Laboratory Technicians*  
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 Frances Hackett, *Senior Departmental Stenographer*  
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 John Chamberlain, *Paleobiogeology*  
 Joseph Gennaro, *Electron Microscopy*  
 Myron Jacoby, Ilya Glezer, Peter J. Morgan, *Cetacean Neuroanatomy*  
 Martin P. Schreibman, *Fish Endocrinology*

(continued from page 2)

An important part of the Society's commitment to conservation is its work in captive propagation. Breeding programs at the Wildlife Survival Center on St. Catherines Island, Georgia, complement those at the Zoo and Aquarium. This refuge, established in 1974, provides a spacious natural setting for large breeding groups of endangered species – particularly antelopes, primates, marsupials, tortoises, and birds. Altogether, more than 1,100 mammals, birds, reptiles, amphibians, and fishes were born or hatched at the Bronx Zoo, Wildlife Survival Center, and New York Aquarium in 1987, including offspring in 65 endangered species.

Veterinary care for all NYZS animal collections is administered by the **Animal Health Center**, the Bronx Zoo's modern research hospital. The program was established in 1902 and has pioneered in tuberculosis control, preventive medicine, radiography, antibiotics use, immobilization techniques, and vitamin supplementation. Major research projects at the Center are devoted to the reproduction biology of vanishing species [developing knowledge and techniques that will improve captive breeding], and to a broad range of nutritional subjects, including the role of key vitamins and minerals in animal diets. The Center also offers training for veterinary students, interns, and technicians as well as zoo and WCI field staff.

#### Funding the Society's Programs

To operate programs of such wide range and magnitude cost \$48,197,421 in fiscal year 1988, including capital outlays totaling \$10,056,716. Financial information for the period ending June 30, 1988, appears on pp. 59-67 of this report.

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Income from government agencies – mainly in the form of New York City payments of keeper salaries and fuel costs, and funds from New York State through the Natural Heritage Trust – accounted for \$11,903,405, or 31 percent of the Society's general operating revenues. Other income is provided by admissions and visitor services at the Bronx Zoo and New York Aquarium (\$15,159,061, or 41 percent); private contributions, membership dues, earned income, and endowment (\$9,647,879, or 25 percent); and publications, education programs, and miscellaneous sources (\$1,491,302, or 3 percent). The base support is broad, and growing. At June 30, 1988, the Society had 33,610 members and more than 30,000 annual contributors, including individuals, foundations, and corporations.

For fiscal 1989, the Society's general operating expenditure budget has been projected at \$44,000,000. The Society completed a \$20 million capital drive in 1982, which helped to raise endowment and finance several important projects, including the new Children's Zoo. From 1983 through June 1988, the Second-Century Campaign raised more than \$26.5 million for capital projects, including Jungle World, Himalayan Highlands, and the Elephant House renovation at the Bronx Zoo; Discovery Cove and Sea Cliffs at the Aquarium; and construction of the new Central Park Zoo.

With increased responsibility for wildlife survival and growing public interest in nature and conservation, the Society has conducted a long-range planning effort that will lead to the redefinition of its overall programs and the further development of many of its facilities.

#### Recommended Form of Bequest

The Trustees of the Society recommend that for estate planning purposes, members and friends consider the following language or use in their wills:

"To the New York Zoological Society, a not-for-profit, tax-exempt membership organization incorporated by the laws of the State of New York in 1895, having as its principal address the New York Zoological Park, Bronx, New York 10460, I hereby give and bequeath \_\_\_\_\_ for the Society's general purposes."

In order to help the Society avoid future administration costs, it is suggested that the following paragraph be added to any restrictions that are imposed on a bequest:

"If at some future time in the judgment of the Trustees of the New York Zoological Society, it is no longer practical to use the income or principal of this bequest for the purposes intended, the Trustees have the right to use the income or principal for whatever purposes they deem necessary and most closely in accord with the intent described herein."

If you wish to discuss the language of your bequest with a member of the Society's staff, please be in touch with the President's office [212] 220-5115.

Howard Phipps, Jr.  
President

California sea lion Fin at his new home near the Plaza Hotel.



#### 1987-1988 Highlights and Vital Statistics

Bronx Zoo attendance for the year was 2,332,483, the highest since 1972. The Aquarium's attendance of 775,227 was a record for the Coney Island location, inaugurated in 1957.

Membership in the Society rose to 33,610. Contributions to the Society from foundations, corporations, and individuals — including dues, gifts, pledges, and bequests — totaled \$10,803,002.

Born or hatched at the Bronx Zoo, New York Aquarium, and Wildlife Survival Center were more than 1,100 mammals, birds, reptiles, amphibians, and fishes.

Significant offspring included two lowland gorillas, three snow leopards, eight naked mole rats, one Malaysian tapir, one gelada baboon, one bird of paradise, one Costa's hummingbird, seventeen Chinese alligators, thirty-three Malagasy radiated tortoises, fourteen Dumeril's ground boas, one harbor seal, and several dozen pipefish.

At the end of 1987, the New York Zoological Society was responsible for 3,963 animals of more than 650

species and subspecies at the Bronx Zoo, 326 animals of 46 species at the Wildlife Survival Center, and 3,161 animals (plus numerous invertebrates) of 275 species at the New York Aquarium. More than 250 of the total species were listed as rare, threatened, vulnerable, or endangered.

731 animals were exchanged, many for breeding purposes, between the Society and other zoological institutions.

The Small Mammal House at the Bronx Zoo was renovated and reopened as MouseHouse on April 29, 1988. Work was begun in the spring on the African Highlands and Plaza and the John Pierrepont Wildfowl Marsh. The new Central Park Zoo was nearly complete and scheduled to open on August 8, 1988.

Wildlife Conservation International (WCI) sponsored 70 field projects in 32 countries, including new initiatives in Mexico, Argentina, Venezuela, Paraguay, Ecuador, Ethiopia, Gabon, Kenya, Uganda, Tanzania, Malagasy Republic, China, Guam, Indonesia, India, the Philippines, Papua New Guinea, and Thailand.









